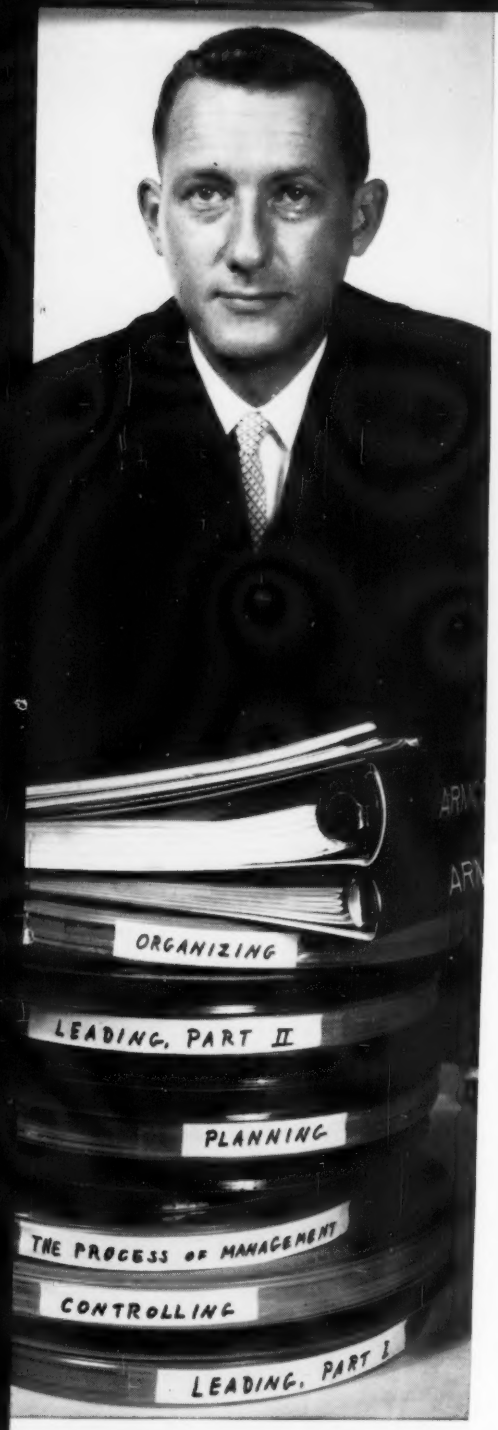


Armco Accelerates Manager Training

James Townsley, Armco Steel Corp. foreman, believes he is a better manager today. He is one of 2500 who have taken Armco's mobile and flexible "Profession of Management" course within a year. A movie-conference method is used. Page 84

STEEL

The

Metalworking Weekly

OCTOBER 17, 1960

A PENTON PUBLICATION

GE Strike: Fight Over 'Boulwareism'

Explosives Shape, Press, Even Weld Brittle Ceramics and Metal Powders

When to Use Stacked Stampings

Metal Powder Sales Buck the Trend

CONTENTS—TURN PAGE

Did you see Heald's NEW Model 171A Internal?

It's LOADED with new features for better production and easier servicing!

1. **Cross-slide Wheelhead Feed** assures maximum freedom from distortion under heavy roughing cuts—feeds faster and more accurately, with better size control.
2. **Right-Hand Feed Box** provides either constant feed or impulse feed that advances the wheel only at reversals of the table. Gives better finish and straightness on long bores. Manual override permits operator to fast feed or retract at any time.
3. **Infinitely Variable Compensation** for wheel wear, from 0 to .004", contributes to more constant size and longer wheel life.
4. **Front-Adjusted Wheel Dresser** is easier and safer to operate.
5. **Hydraulic Workhead Drive** provides greater range of speeds (from 50 to 1350 rpm) at the turn of a knob.
6. **Machine Base Contains No Heat-Producing Equipment** —hydraulic power and lube oil units are externally mounted, preventing thermal distortion and permitting easier access for servicing. Variable-displacement hydraulic system pumps oil only when it is *needed* to operate a cylinder or motor.
7. **Hydraulic and Electrical Cabinet** contains all hydraulic and electrical control mechanisms in separate dust-tight compartments—everything is easier to get at. Faster-acting miniature d-c solenoid valves speed-up cycles, last longer.
8. **Large Cabinet-Type Guards** cover entire work area and open automatically for greater safety, better coolant control and easier access for fixture changeover.

Heald Model 171A Internal Grinders are available in Size-Matic, Gage-Matic or Plain models for work with up to 8" swing and angular capacity up to 90°.

Ask your Heald engineer for complete information, or send for your copy of Bulletin No. 2-171A-1.

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

HEALD

This Week in STEEL

The Metalworking Weekly

October 17, 1960 Vol. 147 No. 16

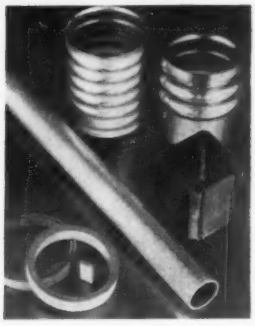
GE Strike: Fight Over 'Boulwareism'

Although Lemuel R. Boulware has retired from General Electric, where he was a vice president, his industrial relations philosophy continues. Jim Carey and his IUE are really striking at that philosophy, which they call "Boulwareism," in the GE walkout. The showdown is coming. PAGE 81

Firm Centralizes Warehouse, Ships by Air

Under a new distribution setup called Unimarket, Raytheon Co. can service orders at a rate usually reserved for emergencies. Shipments are made by air from a central warehouse. The secret: Prepunched cards enclosed with orders. To reorder items, distributors gather cards and feed them into transmitters at district offices. On receipt at the warehouse end of a leased wire, data cards, packing slips, and invoices are created simultaneously. Orders are shipped in 2 to 4 hours. PAGE 92

Three Bull's-Eyes Scored in Explosive Metalworking



Researchers at Battelle Memorial Institute say tests they have made demonstrate that we've scarcely begun to appreciate the new art of explosive metalworking. Three examples cited: 1. They corrugated and sized metal tubes containing extremely brittle cermet cores. 2. They put stainless cladding on stainless-ceramic tubes in a single blast. 3. They hardened copper plates from Rb 20 to Rb 100 without fracturing the metal. The photo shows some explosively formed shapes the experts term "unusual." For more unusual results of tests, see PAGE 126

When to Use Stacked Stampings

You can make gears, cams, levers, pawls—even pole pieces for electric motors—quickly and cheaply from stacks of stampings, says Carter C. Higgins, president, Worcester Pressed Steel Co. He asserts success with the technique depends on the imagination and experience of designers. He cites a few basic examples to illustrate what can be done. PAGE 130

Metal Powder Sales Buck the Trend

Last year, makers of powder metal parts turned out more than 800,000 pieces. They will probably do as well this year despite sales declines by some of their best customers. Reason: They are out digging for new markets and improving old ones. They anticipate their biggest gains in structural and high temperature, high density, low porosity applications and in the development of such metal powders as titanium and zirconium. PAGE 171

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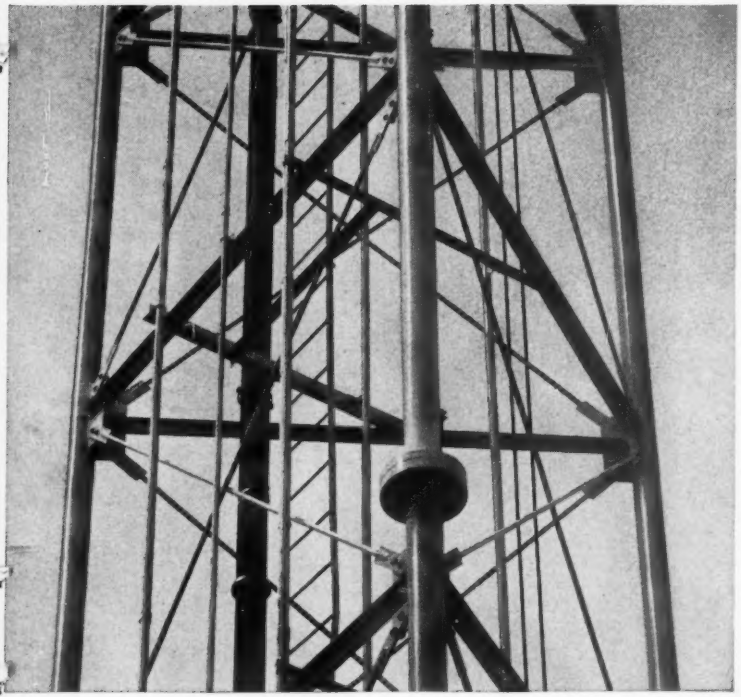
Steel

for Strength . . .
Economy . . .
Versatility

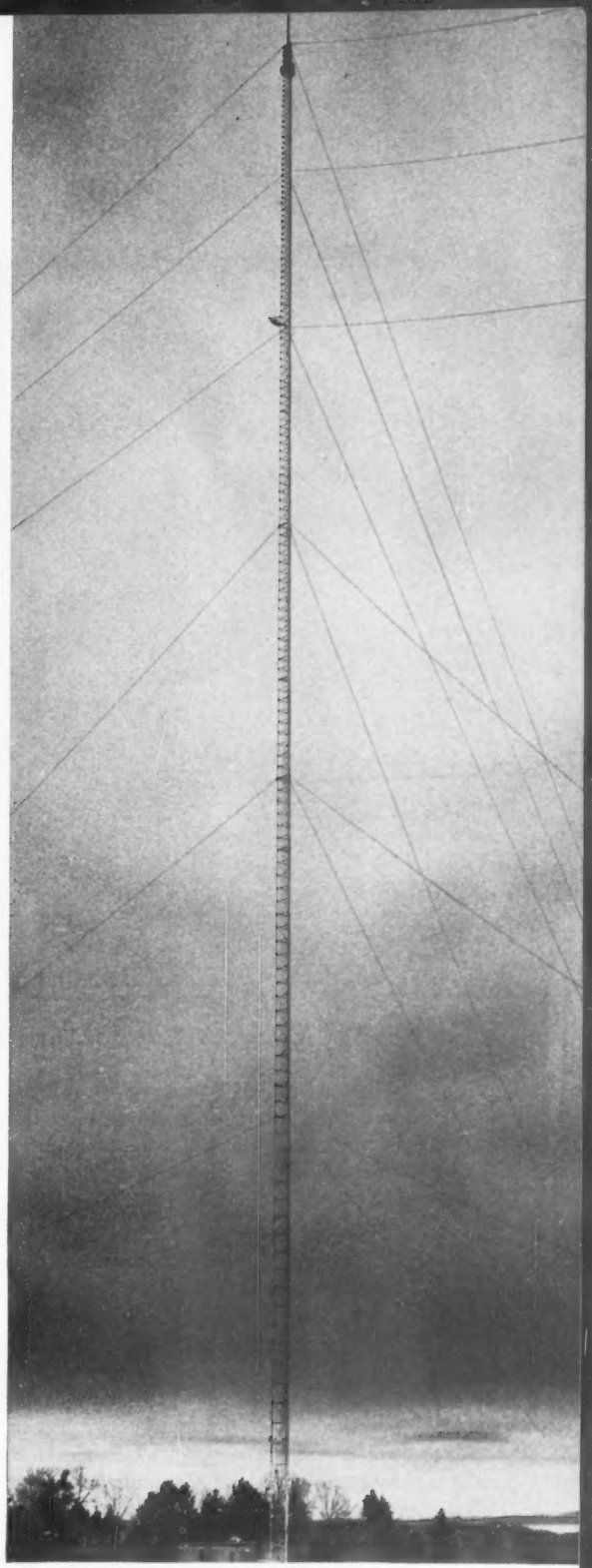


Legs of high-strength steel cut deadweight in 1,619-ft TV tower

How to support an 11-ton antenna 1,619 ft above the ground—higher than man had ever built before? Kline Iron & Steel Co. handled this tricky job last fall. WGAN-TV, Portland, Me., now broadcasts over an area of 75-mile radius.

A giant triangular prism, 10 ft on a side, the 260-ton tower is supported all the way up by three slim legs of Bethlehem Medium-Manganese steel bars. By utilizing this high-strength steel, Kline was able to reduce deadweight of the legs by almost one-third (compared to conventional A7 steel). The legs are only 6-in. in diameter at the base of the tower, and 4½-in. at the top; yet they're strong enough to help the tower resist wind velocities up to 150 mph.

Bethlehem Medium-Manganese steel has twice the atmospheric-corrosion resistance of carbon steel, and can be welded satisfactorily by the proper technique. It's available in bars, bar shapes, plates, structural shapes, sheets, and in other forms. For more information about this versatile steel, simply contact your nearest Bethlehem sales office. Or write to our Publications Department for Folder 628, *Bethlehem Medium Manganese*.



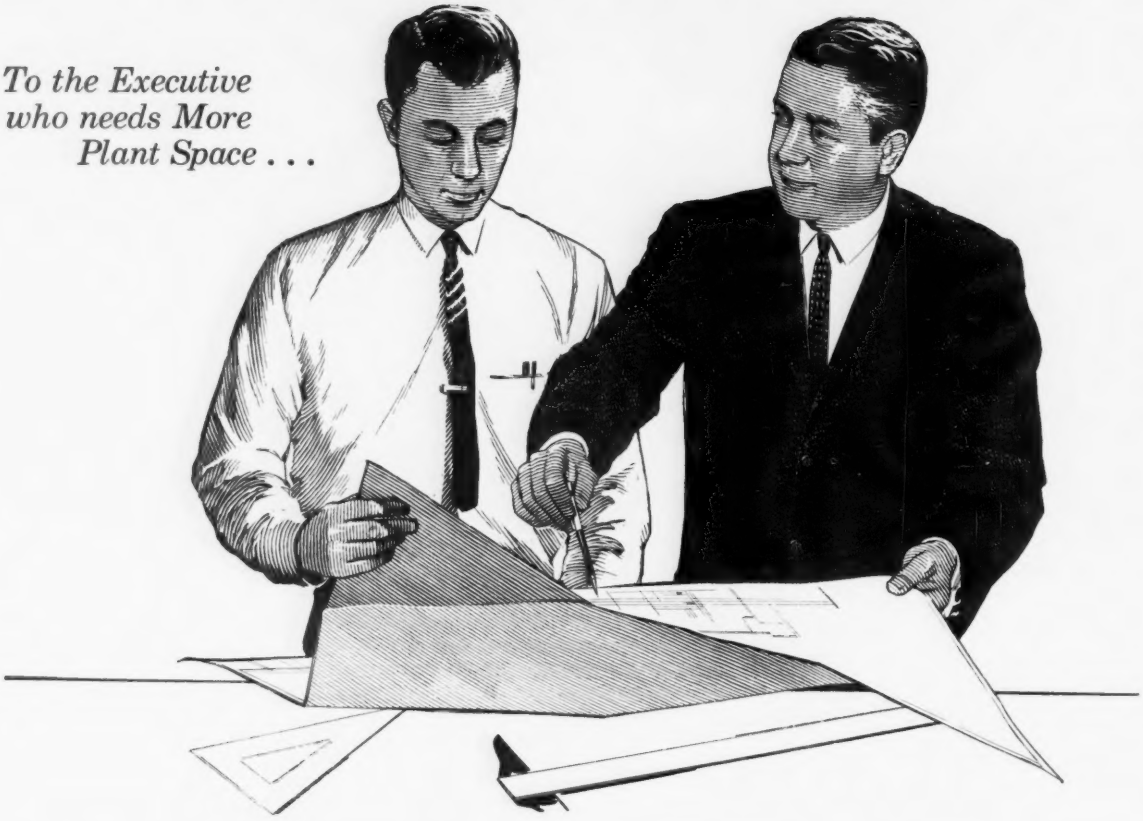
A KIMCO tower, designed, fabricated, and erected by Kline Iron & Steel Co., Columbia, S. C.

Bethlehem Steel Company, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

To the Executive who needs More Plant Space . . .



Why not simplify your present operations by using Clad-Rex® vinyl-clad metals?

Why not, indeed! Your investment in equipment, space and labor for finishing operations might be much more profitable in other activities. And what about the time and cost to strip and rework the rejects common to assemblies finished with relatively delicate coatings . . . ?

Clad-Rex vinyl-clad metals can be moved directly from forming to assembly, because they're already finished. This also eliminates a lot of costly metal treating and handling. The abrasion resistance of Clad-Rex sharply reduces rejects. As a matter of fact, the vinyl surface is so practical, Clad-Rex vinyl-clad metals can be worked much the same as bare metal. No special tooling or involved technique is needed.

These factors can lower your end product cost even though Clad-Rex vinyl-clad metals cost more to buy than *un*finished metals. Furthermore, you add sales appeal, because Clad-Rex styling is almost unlimited.

It's worth looking into—particularly when you realize your existing tooling (including forming dies) can be used in most cases. Clad-Rex has a Field Fabricating Engineer available to show your production people how easy it is to get into production.

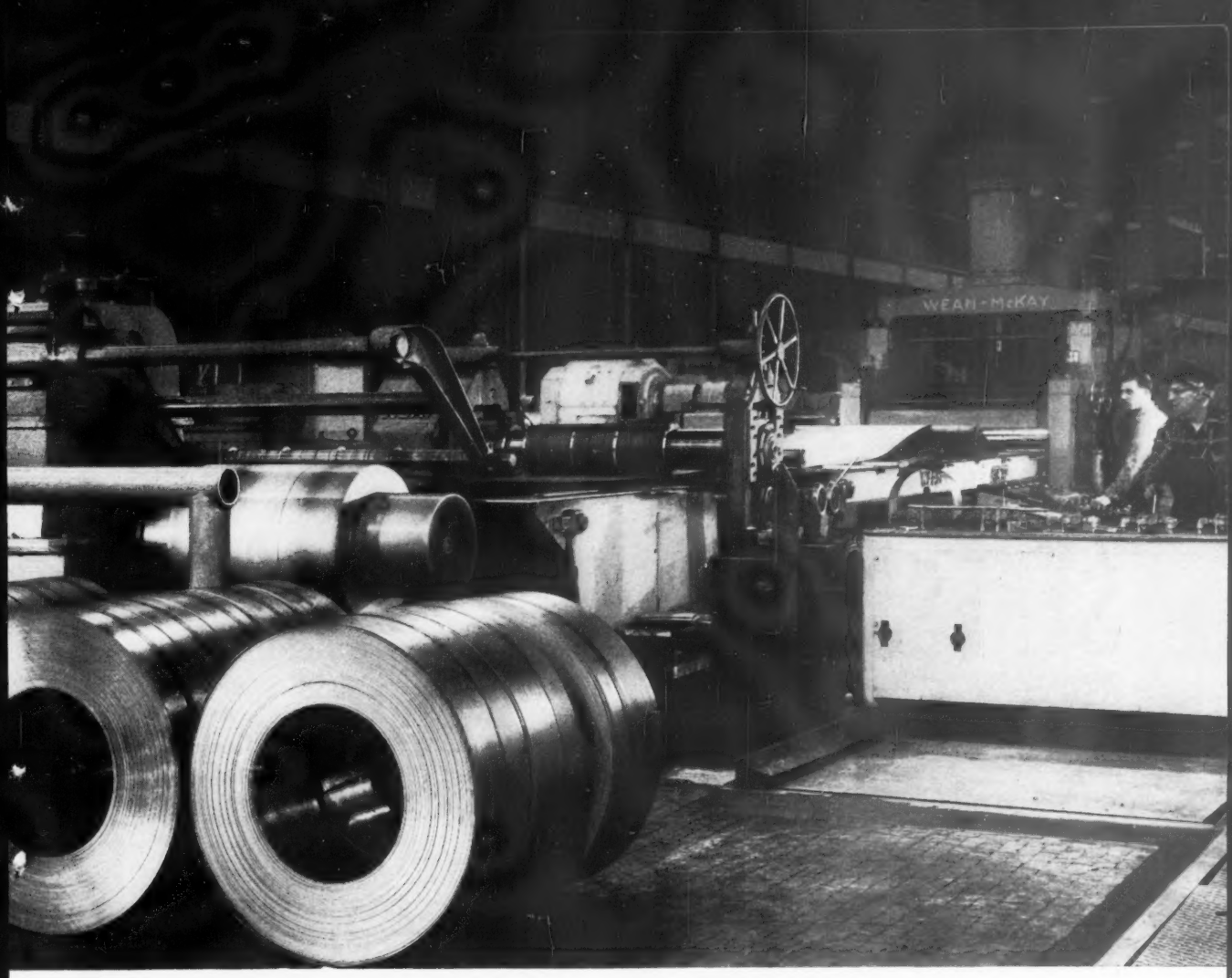
See for yourself. Write and ask for details on Clad-Rex vinyl-clad metals. No obligation, of course.

VINYL-METAL LAMINATES BY **CLAD-REX**® DIVISION OF SIMONIZ COMPANY

11504 W. King Street • Franklin Park, Illinois

Telephone: GLadstone 1-2323

12A



Pittsburgh Steel keeps production costs down with Wean Hot Rolled Strip Slitting Line

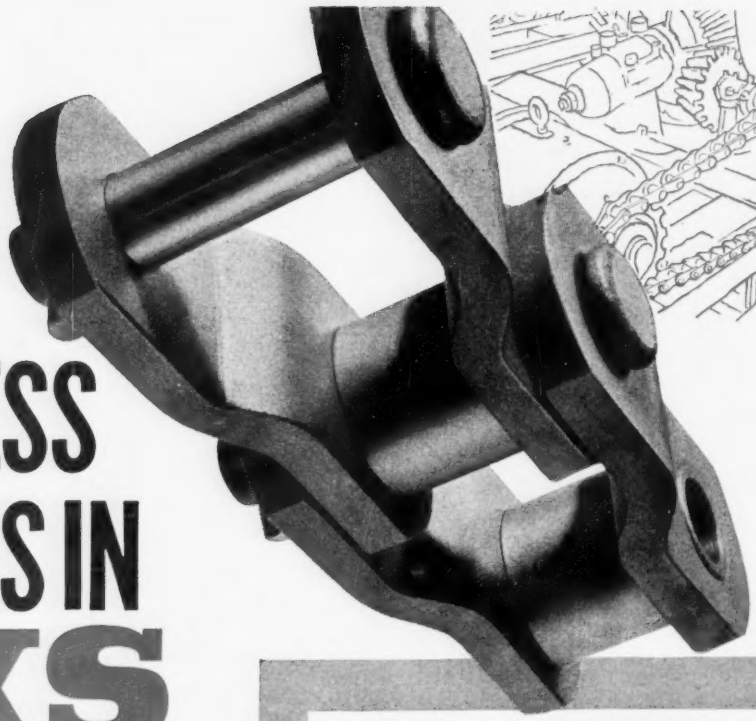
Pittsburgh Steel Company maintains a high production rate at its Allenport, Pennsylvania hot strip mill with this heavy duty Wean slitting line. The Wean line allows Pittsburgh Steel to follow the economical practice of rolling wide strip and then slitting it to a variety of customer-specified widths. It not only frees the hot strip mill of production runs with narrow strip, but also enables Pittsburgh to offer a wider range of strip widths.

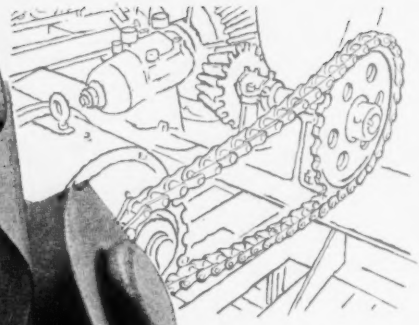
This line can handle coils up to 60" O.D., recoiling the slit strands on either 20" or 24" expanding mandrels. Strip ranging from 18" to 60" in width and .049" to .188" in thickness can be side-trimmed and slit at speeds up to 300 fpm. A processing uncoiler "works" the strip to eliminate serious cross-breaks and flattens it to permit accurate slitting.

We would like to suggest that you put Wean's extensive experience to work on your next slitting line project. You will find that in slitting, as in all phases of sheet, strip and tin plate processing, Wean "creative engineering" leads the field in design and construction of modern processing line equipment.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO



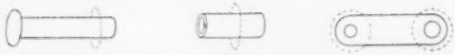


FAR LESS STRESS IN LXS

THE CHAIN WITH NO "STRESS RAISERS"!
Link-Belt LXS brings long-term economy and efficiency to the most punishing drive and conveying jobs. With its "FULL-ROUND" design, LXS has no stress concentration points . . . none of the sharp corners which frequently shorten the life of many ordinary chains.

LXS is available with straight or offset sidebars. For details, contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.) Ask for our new, comprehensive Catalog 1050.

They're all of "FULL-ROUND" design



PINS BUSHINGS SIDEBARS

"FULL-ROUND" design eliminates traditional stress concentration points in Link-Belt LXS . . . provides maximum live bearing area between pins and bushings. Result: stress is distributed evenly.

Other LXS long-life features include controlled press fits plus use of selected steels and controlled hardening of all parts. All this contributes to greater uniformity, greater endurance.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,063

May Usership Winner Collects Second $500

Allan Frew points to a relined, cyanide hardening furnace that earned him another $500 in our Usership Idea of the Month Contests. (See STEEL, July 25, p. 5.) Our regional sales manager in New England, Cal Fisher, was on hand to view the completed job and learn how Mr. Frew got his $1000 idea from a STEEL article (about a spray-on castable refractory material).

Our winner, purchasing agent for Waterbury Buckle Co., Waterbury, Conn., had this to say in proving his eligibility for the second cash award:

". . . We relined one of our furnaces, as described in my May Usership entry, and the unit has been in operation continuously since that time. Our main problem was eliminating downtime. We considered the price of relining insignificant compared with the costly downtime involved. Each time this furnace had to be shut down for repairs (three times last year), a minimum of five days elapsed before it could be put into production again.

"The new relining method takes three days and costs only $350 vs. $468 for the old way. The new job carries a one year guarantee, so if we require service within that period, our downtime will be reduced and there will be no charge for the repairwork."

In Substantiation . . .

. . . of his efforts, Mr. Frew sent along copies of invoices from contractors and detailed figures that showed costs to the company. The savings amount to considerably more than we have divulged. Some of the figures were given to us confidentially (after all, the firm does have competitors).

When Mr. Frew avowed he had zeroed in on the second $500 award, we asked what he would do with the money. He replied: "It is earmarked for an education fund for our children—another $500 will surely help!"

So far, $4000 has been given to winners in our monthly contests. Have you entered? You have until Nov. 1 to enter our September contest.

You Can Win $1000 This Month

There are five issues of STEEL this month — and one could help you win $1000 in our Usership Idea of the Month Contest.

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—October, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . You will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You may enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

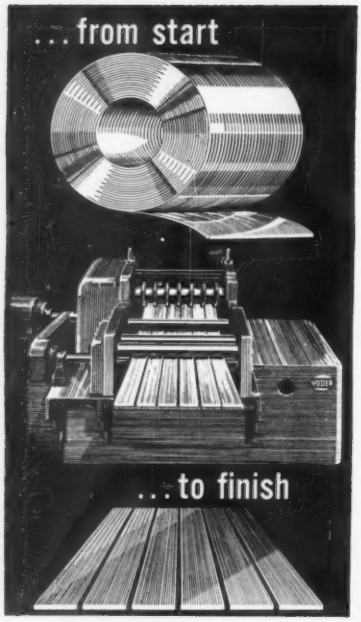
Send entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Dec. 1.**

Requests for Copies . . .

. . . of the Sept. 5 issue continue to pour in. If you'd like to have one copy of the 48-page reprint of the editorial section, just drop a line to our Reprint Dept., 1213 W. Third St., Cleveland 13, Ohio.

Paul W. Norris, president, Denison Engineering Div. (Columbus, Ohio), American Brake Shoe Co., wrote: "The material in this issue has stimulated so much interest in our organization that we could well use an additional ten copies."

Carl A. Lange, president, Apex Machine & Tool



YODER ROTARY SLITTERS

If your slitting requirements call for coil widths from 12" to 60", in gauges from .015" to .250", the economy of purchasing Yoder Slitting Machinery can be yours. Operating a Yoder Slitting Line only one eight-hour shift per week, for example, could easily produce 35 tons of slit strands per week... or 1,820 tons every 52 weeks. At a slitting cost saving of only ½¢ per pound, the annual savings would amount to $18,200.

Additional savings can be realized through lowered inventory of mill-width coils—less waiting for delivery of special slit widths. Also, customer satisfaction will increase as you achieve faster completion and delivery of finished products.

At your request a Yoder sales engineer will study your plant operation to determine what equipment would most economically... and profitably... serve you, whether it be standard components or a completely specialized and engineered line.

Send for Yoder's illustrated text on slitting operations and equipment. It describes methods, time studies, operating cycles, material handling, and gives full specifications.

THE YODER COMPANY
5502 Walworth Avenue • Cleveland 2, Ohio

YODER ROTARY SLITTING LINES

Co., Dayton, Ohio, said: "We would appreciate 15 copies. We can use them to advantage."

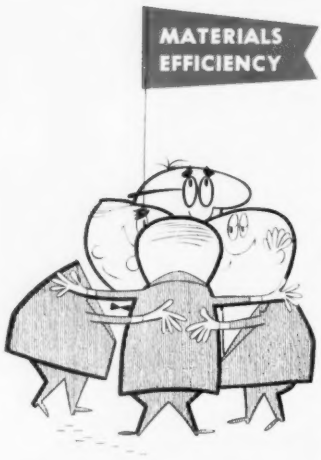
P. W. Arnold, assistant to vice president, Research, Development & Engineering, Reliance Electric & Engineering Co., Cleveland, commented: "I would appreciate receiving six reprints of the issue . . . Thank you for making this worthwhile material available."

Sees Significant Trend

O. R. Strackbein, chairman, Nation-Wide Committee of Industry, Agriculture & Labor on Import-Export Policy, Washington, said: ". . . I think you did a remarkable job on your Sept. 5 issue. I cannot, however, suppress a feeling of some disappointment in the views expressed by so many of the executives in the article, 'Our Dilemma: How Presidents See It.' Mr. Wearly of Joy Mfg. Co. said: 'In 1958 we had 6100 employees in the U. S. and 800 abroad. Today, we have 4800 here and 2000 abroad.'

"This is a trend that is highly significant and bodes no good for our economy."

Calling Profitable Plays



In nearly every football huddle, the players point out the opportunities for gain. An end drifts with a play, a guard isn't charging . . . The offensive quarterback usually calls plays to take advantage of the weaknesses.

Now, let's turn to industry for an example that crops up on management teams. The production manager wants high inventories (so he won't be forced to shut down because of material outages); the financial executive wants low inventories (because he knows carrying inventories can be costly); the purchasing agent doesn't necessarily want either, although at times he would like to accumulate inventories (especially when he can get good prices by placing volume orders). The solution to the business conflict is in better teamwork, and one way to get it is through effective use of the materials management concept.

Next week, Associate Editor George Howick will give you a seat on STEEL's 50 yard line and call the plays that will help you develop a strong materials efficiency program.

... Fluid Power news

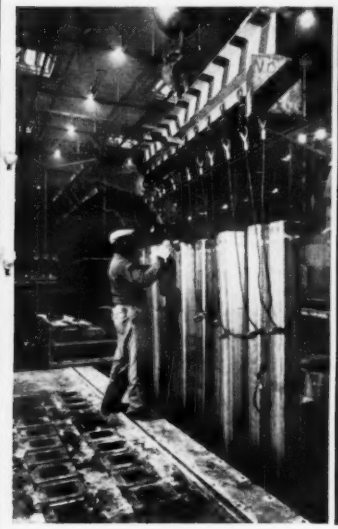
REPORT NO. 11,805 CASTING FEEDS NOT AFFECTED BY LOAD VARIATIONS

From Oilgear *Application-Engineering* Files

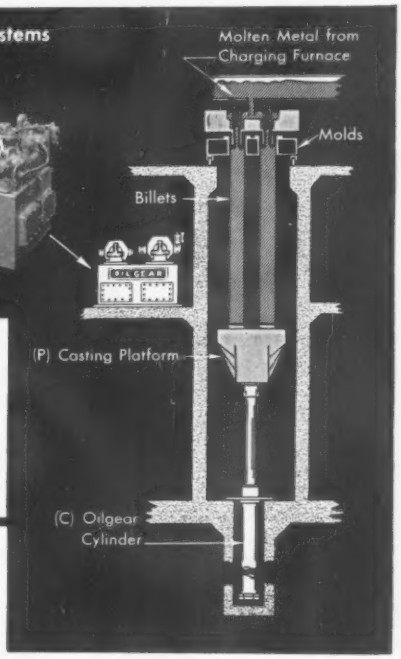
HOW OILGEAR SYSTEMS IN KAISER ALUMINUM PLANTS AID DIRECT CHILL BILLET CASTING PRODUCTION

USER: *Kaiser Aluminum & Chemical Corporation*

PROBLEM: To supply direct chill billet casting platform power and control systems for production of a major portion of the 1,050,000,000 lb of aluminum consumed annually by domestic extruders. Direct chill billet quality — avoidance of internal cracking, homogeneity, grain structure fineness and orientation — depends on a smooth, unvarying, precise platform feed rate, careful control of pouring speed and temperature, cooling rate, and other variables to prevent atmospheric oxidation and impurities. Up to 32 billet logs over 18 ft long are to be produced in a single cast. POWER AND CONTROL SYSTEM REQUIREMENTS: 1. Remote pushbutton control of all functions. 2. Rapid platform traverse up and down. 3. Infinite "down" feed rate selection — unvarying regardless of casting platform load increase; chatter-free — unaffected by off-balance platform loads. 4. "Fail-safe" — insuring completion of a cast in event of power failure. 5. Must be simple, and assure long, trouble-free, dependable service.



Application-Engineered Fluid Power Systems For Direct Chill Casting Stations



HOW IT WORKS: The Oilgear Variable Displacement Pump (1) on "Power-Pak" (A) provides adjustable preset slow and fast speeds for raising and lowering casting platform (P). Oilgear Variable Displacement Piston-type Precision Metering Pumps (2) are connected in series hydraulically between Oilgear Cylinder (C) and "Power-Pak" (A) Reservoir. Ram down-feed during casting is dependent upon control setting of the Secondary Metering Pump — remotely pushbutton-controlled to provide instant, precise, feed rate adjustment ... indicated in ipm on a direct reading indicator. Oil, increasing in pressure as the billet load increases, flows from Cylinder (C) through sealed, "pressurized," Primary Metering Pump — and then, at relatively constant low pressure, through the Secondary Metering Pump to "Power-Pak" (A) Reservoir — providing an extremely accurate casting feed rate regardless of varying platform load. An automatic, Oilgear hydraulic control varies Primary Metering Pump displacement to compensate for load variation and feed rate selected. "Fail-safe" operation is provided through Oilgear Valves.

Above: Rapid traverse is used to raise the casting platform, bringing, in this case, the 6-in.-sq. by 18-ft billet logs out of the casting pit for identification with cast number at one of three direct chill casting stations at Kaiser Aluminum's Chalmette, La., Works. Direct chill "molds" are clearly visible behind the "marker."

SOLUTION: Oilgear's patented Feed and Control System provides accurate volumetric metering of pressurized oil over a 200:1 pressure range, and a 100:1 feed range. Installations consist of an Oilgear Variable Displacement Pump direct-connected to an electric drive motor, two Oilgear Precision Variable Displacement Metering Pumps direct-connected to a double-end synchronous electric motor — all mounted on a custom-built reservoir base (A); and Oilgear piston- and ram-guided, chatter-free, *Custom-Quality* Cylinder (C); Oilgear Valves and Controls ... all thoroughly, carefully *Application-Engineered.*

USER REPORTS — "Where accumulating load on the platform varied oil pressure from 50 to 1500 psi, and the rate of metering was preset anywhere from 50 to max. cipm, *there was no measurable change on the preset rate of casting feed during any portion of the stroke.*"

There has been NO major maintenance on these heavy-duty Oilgear Systems operating continuously in Kaiser Aluminum plants across the nation — some for over 7 years — and still "going strong."

THIS PATENTED OILGEAR METHOD of precise metering — and other accurate Oilgear Control Systems — have been applied to a wide range of applications in many industries where varying loads must not affect the speed of linear movement or hydraulic motor rotation. Carefully Application-Engineered Oilgear Systems — also used extensively on extrusion presses ... aluminum foil laminating machines ... stretching, forming, drawing and spinning presses ... can-closing and filling machines ... metal briquetting presses ... ladle tilting, ingot manipulators, strippers, and scalpers — have all proved Oilgear equipment's traditionally long life, prompting users to state —

"for the lowest cost per year ... it's Oilgear!"

For similar practical solutions to YOUR linear or rotary motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements directly to ...

THE OILGEAR COMPANY

Application-Engineered Fluid Power Systems

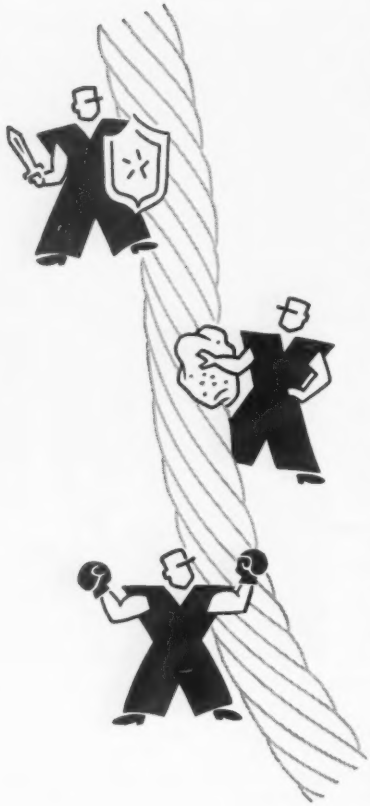
1572 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN

Phone: Mitchell 5-6715 ... Direct Distance Dialing Code 414

DOUBLE GRAY-X®

...the wire rope with the

EXTRAS



First — because it's made of *extra* improved plow steel — Double Gray-X has *extra* high breaking strength (15% higher than the catalog breaking strength of non-premium ropes of the same construction). Second — due to Wickwire's new wire drawing process — Double Gray-X gives *extra* long service. Double Gray-X has:

MOLECULAR SHIELD

The use of molybdenum disulphide in the wire drawing results in a shield several molecules thick which lubricates the individual wires and prevents them from grinding against each other when the rope operates. Less internal friction means more rope life.

SMOOTHER WIRE SURFACE

Before Double Gray-X, the most carefully drawn rope wire contained minute surface imperfections. Wickwire's new wire drawing technique improves the surface finish. Smooth surfaced wires provide better resistance to fatigue.

EXTRA TOUGHNESS

Molybdenum disulphide lubricates the wires during the drawing process. Less power is required and less heat is generated during this operation. The original inherent toughness of the wires is better preserved.

Double Gray-X is available in many different sizes and constructions. To reduce your operating costs, you should insist on Double Gray-X. For complete information, contact your local Wickwire distributor. We'll be glad to give you his name and address. Write to Wickwire Spencer Steel Division, Wire Rope General Sales Department, P.O. Box 232, Palmer, Mass. 7953

WICKWIRE ROPE · DOUBLE GRAY-X · DOUBLE GRAY-X · A CF&I PRODUCT

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION

DENVER • OAKLAND • NEW YORK

CF&I STEEL

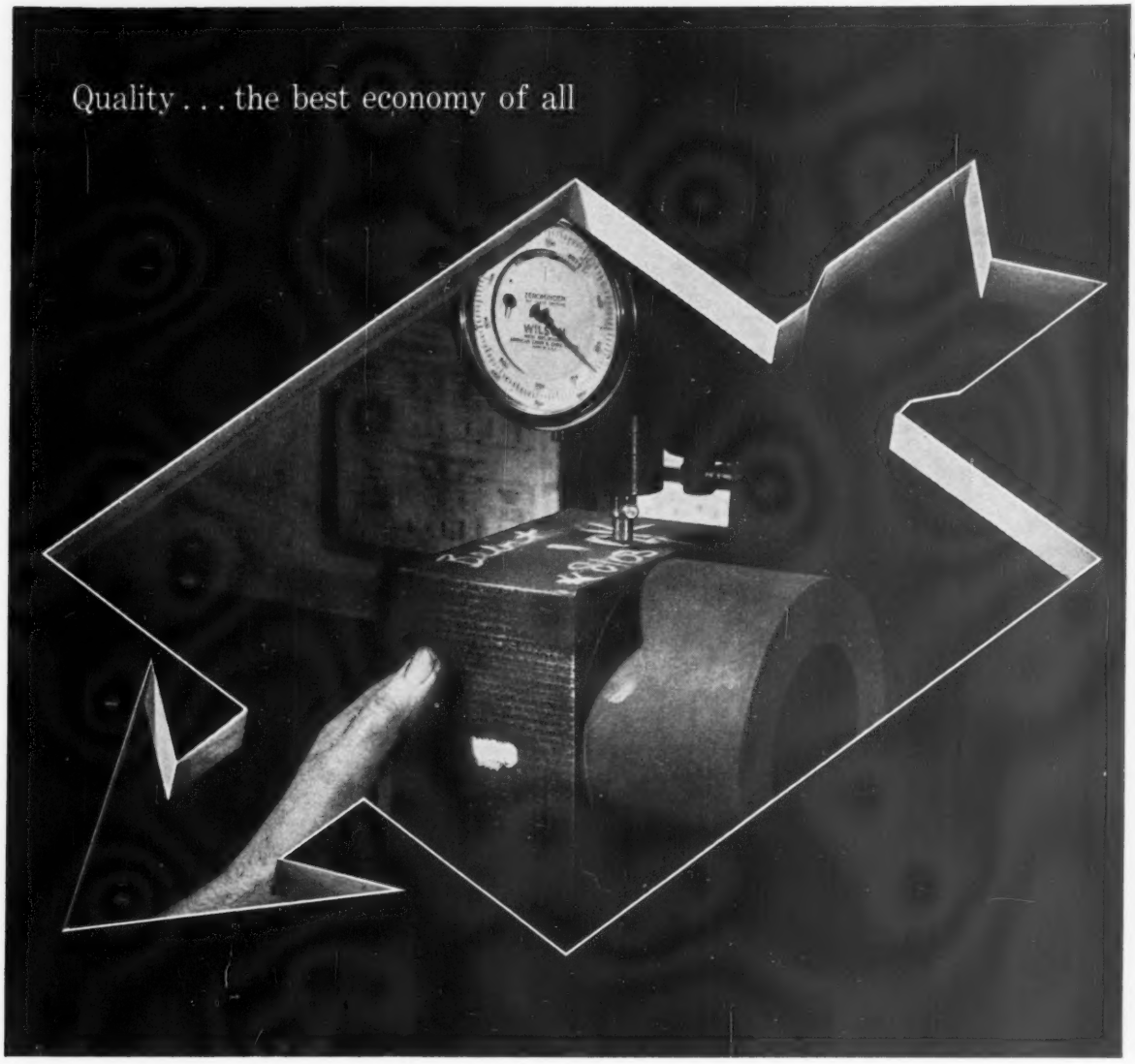


Photo courtesy of J. W. Rex Corp.

To hit the exact qualities you want . . . you need a choice of quenching oils

You can *get by* with just one quenching oil. But you can't always get the *best results* . . . not when you measure quality to a fine degree. Very often, you need a choice.

Sun makes quenching oils to reduce cooler-maintenance costs... oils with high antidecomposition qualities . . . oils for fast-quenching operations . . . oils for marquenching . . . and other "specials."

See your Sun representative for help in evaluating your quenching needs. He'll show you how to save money while maintaining quality . . . the best economy of all.

SUN OIL COMPANY, Philadelphia 3, Pa. Department S-10. In Canada: Sun Oil Company Limited, Toronto and Montreal.

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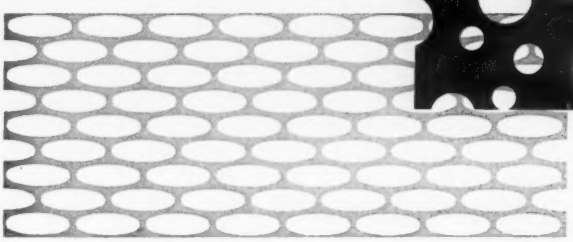
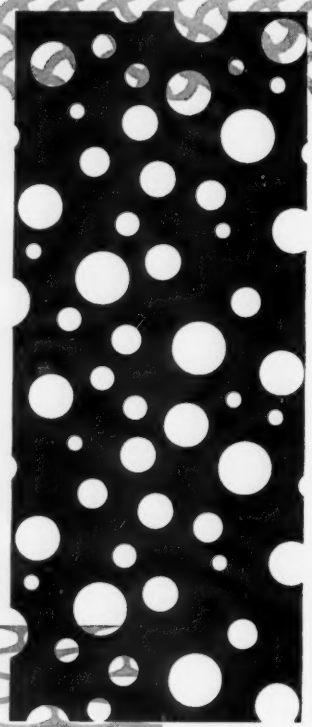
And there is also a vast selection of additional patterns and open areas which can be custom fabricated from existing dies. H & K can perforate practically any material. May we put our more than 75 years of experience to work for you?





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CALENDAR
OF MEETINGS

Oct. 17-18, Magnesium Association: Annual convention, Pick-Carter Hotel, Cleveland. Association's address: 122 E. 42nd St., New York 17, N. Y. Executive secretary: Jerry Singleton.

Oct. 17-19, American Society of Lubrication Engineers and American Society of Mechanical Engineers: Joint lubrication conference, Statler-Hilton Hotel, Boston. ASLE's address: 5 N. Wabash Ave., Chicago 2, Ill. Executive secretary: Calvert L. Willey.

Oct. 17-21, Metallurgical Society of AIME: Annual fall meeting, Sheraton Hotel, Philadelphia. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Oct. 17-21, National Management Association: Annual meeting, Dinkler-Plaza Hotel, Atlanta. Association's address: 333 W. First St., Davton 2, Ohio. Executive vice president: Marion Kershner.

Oct. 17-21, National Metal Exposition & Congress: Trade and convention Center, Philadelphia. Sponsor: American Society for Metals, Metals Park, Novelty, Ohio. Managing director: Allan Ray Putnam.

Oct. 17-21, Society for Nondestructive Testing: Annual meeting, Philadelphia. Society's address: 1109 Hinman Ave., Evanston, Ill. Secretary: Philipp D. Johnson.

Oct. 19-23, National Tool & Die Manufacturers Association: Annual meeting, Leamington Hotel, Minneapolis. Association's address: 907 Public Square Bldg., Cleveland 13, Ohio. Executive vice president: George S. Eaton.

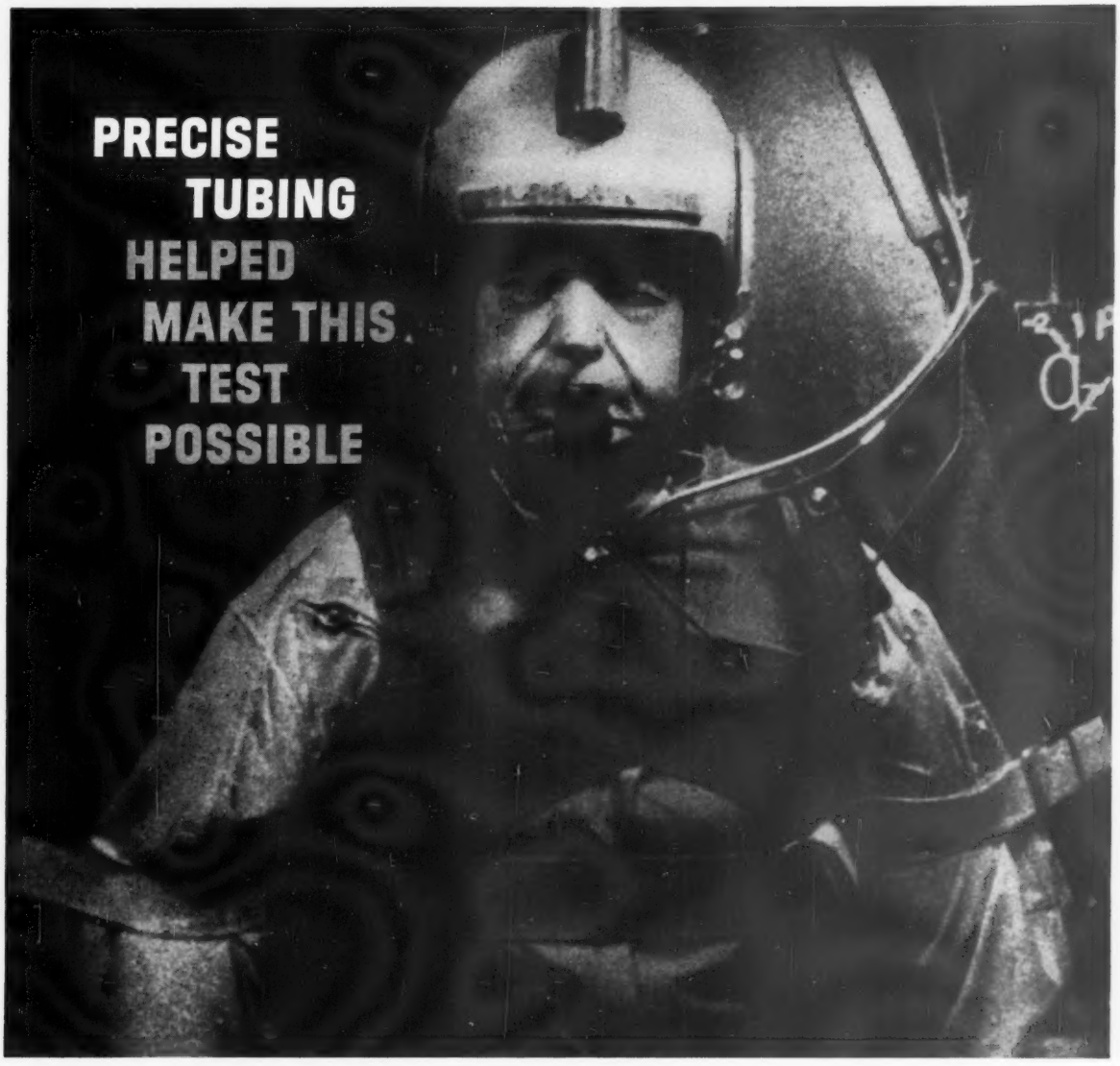
Oct. 20-22, Foundry Equipment Manufacturers Association: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Secretary: C. R. Heller.

Oct. 22-25, Conveyor Equipment Manufacturers Association: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive vice president: R. C. Sollenberger.

Oct. 24-25, American Hot Dip Galvanizers Association: Semiannual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Oct. 24-26, American Gear Manufacturers Association: Semiannual meeting, Edgewater Beach Hotel, Chicago. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive director: John C. Sears.

Oct. 24-26, Grinding Wheel Institute and Abrasive Grain Association: Annual meeting, Whittier Hotel, Detroit. Information: W. Bently Thomas, Thomas Associates, 2130 Keith Bldg., Cleveland 15, Ohio.



That's a test pilot undergoing several "G's" in one of those human centrifuges. His life and the progress of future generations depend on the performance of many tubular parts built to rigid specifications, tight tolerances.

We make stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as super and "exotic" alloys, glass-to-metal sealing alloys and clad metals.

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ARMS CUTTING BLADE WITH HARD, TOUGH EDGES

Steel

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The business end of this land-clearing blade takes a real beating from terrain and timber. It downs brush, trees of all sizes—everything in its path. Shears off stumps at ground level. Piles cut materials into windrows. Drives its stinger through sturdy large trees to split and weaken them. Cuts a wide swath below ground level to build V-type drainage ditches. Works long, hard and fast. ◆ The point of it all? Edges made from ¾" and 1" X-A-R 15 with a hardness of 360 BHN. X-A-R is the name for tougher, harder alloy steels developed by Great Lakes Steel especially to meet abrasion problems. They're made to work better and last longer wherever materials collide with equipment—as liners, teeth, bars, blades, and plates for example. *Under conditions that commonly wear out equipment in a hurry, X-A-R*

Great Lakes Steel is a division of

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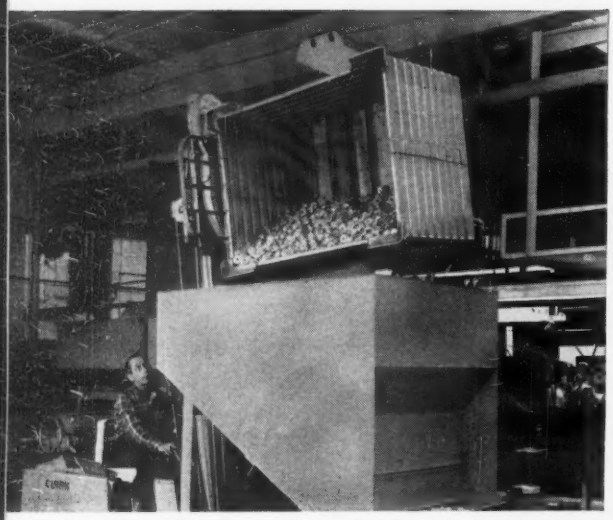
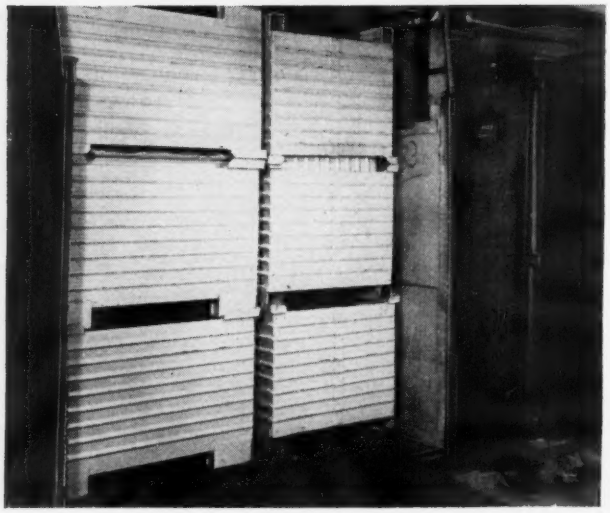
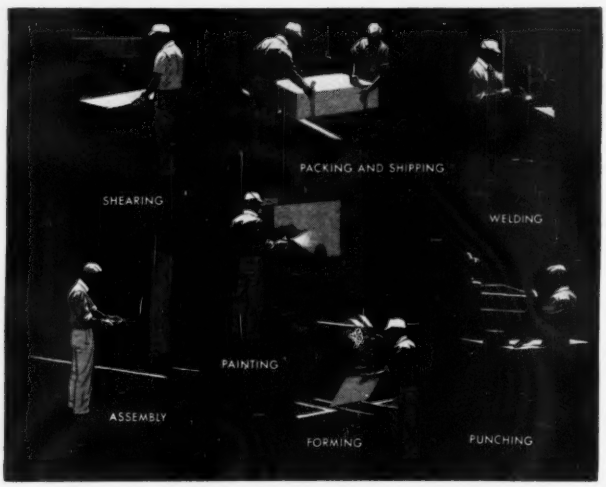


The Republic Roll-Over boxes have channel shaped legs which enable narrow forks to enter the legs, lift the unit, roll it over to hopperize the load, and then return the unit to a normal upright position. The boxes also have 8-way fork entry which facilitates narrow aisle handling.



The unique design of these special Republic Roll-Over Boxes permits nesting four high in trailers for inter-plant shipment. Special stacking brackets hold each Unit in place, eliminate sliding from side-to-side, or front-to-back, for greater safety in shipping and storing, and permit stacking eight high safely in storage areas. The results are savings in storage space, production time, and handling costs.

REPUBLIC STEEL LOCKERS give change, wash, and dress centers a new look, protect employee valuables and tools. Available with popular locking devices. Handles attached with tamper-free Gulmite screws and lockwashers. Bonderizing protects against rust and corsion, reduces maintenance costs. Republic will help you with locker planning, and assume full responsibility for installation. Write today.



REPUBLIC CAN DO IT FOR YOU—complete facilities for fabricating steel sheets, stainless steel sheets, vinyl coated steel sheets. Republic engineers work with you in developing your product, in solving manufacturing, assembly, and delivery problems. Well rounded stock of tools, dies, and a complete machine shop. Modern production line for shearing, punching, forming, painting, assembly. Call your Republic representative or write.

leading appliance manufacturer moves materials faster, easier, safer...with

REPUBLIC ROLL-OVER BOXES

Republic Roll-Over Boxes are used in moving materials to assembly lines in keeping production humming at Whirlpool Corporation, St. Joseph, Michigan.

These Units were designed and engineered by Andy Thomas of the Whirlpool Corporation, in conjunction with Republic material handling specialists, and Carl Thorkelson of Thornel Associates, containerization specialists representing Republic with offices at Chicago, Illinois.

This is a typical example of how Republic material handling specialists and representatives work with industries, big and small, in recommending proper Republic Units to save production time and costs.

Call your Republic representative or write direct for this expert service. Use the convenient coupon below.

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REPUBLIC METAL LUMBER is a versatile building product of 1000 and 1 uses. Faster, safer, stronger framing in any application where common building products are now used. Simply measure, cut, assemble. Engineered slotted angle pattern speeds erection, reduces time and material costs. Solves hard to stock storage problems. Bonderized. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths. Send for attractive brochure.

The Whirlpool Corporation, a leading manufacturer of appliances for the home, has ordered 3000 of these special Republic Roll-Over Boxes. Republic material handling specialists will work with you in recommending standard units or in designing special units to move materials faster, easier, safer. Call your Republic representative, or write direct.

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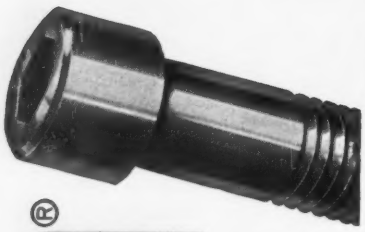

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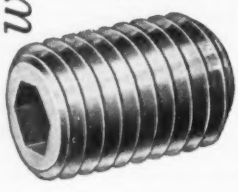

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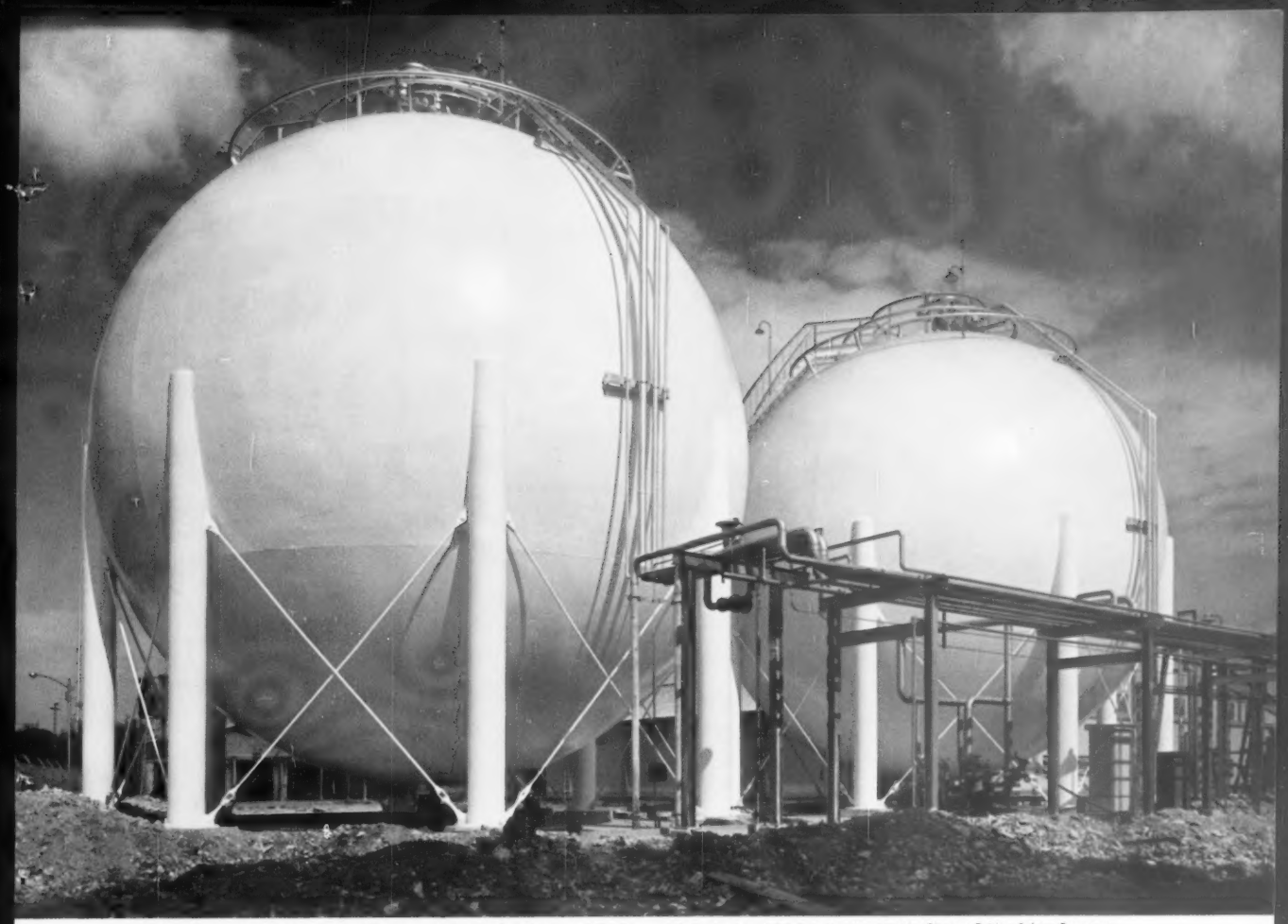

Hortonspheres built of USS "T-1" Steel for Compania Cubana Del Nitrogeno, S. A., Matanzas, Cuba. Designed, fabricated and erected by Chicago Bridge & Iron Company.

Weight cut 50%

in USS "T-1" Steel pressure vessels. Each of these two Hortonspheres in Matanzas, Cuba, has a capacity of 8,750 barrels of anhydrous ammonia. They are 45.5 feet in diameter and each shell weighs about 311,350 pounds. By designing them with USS "T-1" Constructional Alloy Steel, to an allowable working stress of 32,400 psi, the plate thicknesses were reduced to 1.109 inches and 1.075 inches. This is about 50% less than if A212-Grade B fire box quality steel had been used.

Result: Only 363 tons of USS "T-1" Steel were needed for both tanks, reducing by one-half the amount of steel that would otherwise have been required. Freight, handling, welding and erection costs were less—and the user got a stronger, tougher vessel with an overall saving in cost.

Fabrication steps: Plates of USS "T-1" Steel in widths of 78 inches and 115 inches and lengths up to 19 feet 2-½ inches were shaped cold and field stress relieved. Column plates and some shell plates were stress relieved in the shop. Electrodes used in field welding were low hydrogen type of the E110 strength level and all field welds were 100% radiographed. With a minimum yield strength of 100,000 psi, plus toughness, weldability, and high resistance to impact abrasion, USS "T-1" Steel is ideally suited for many applications throughout industry. Write for our latest booklet. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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Hortonsphere is a registered trademark of Chicago Bridge & Iron Company

This mark tells you a product is made of modern Steel

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Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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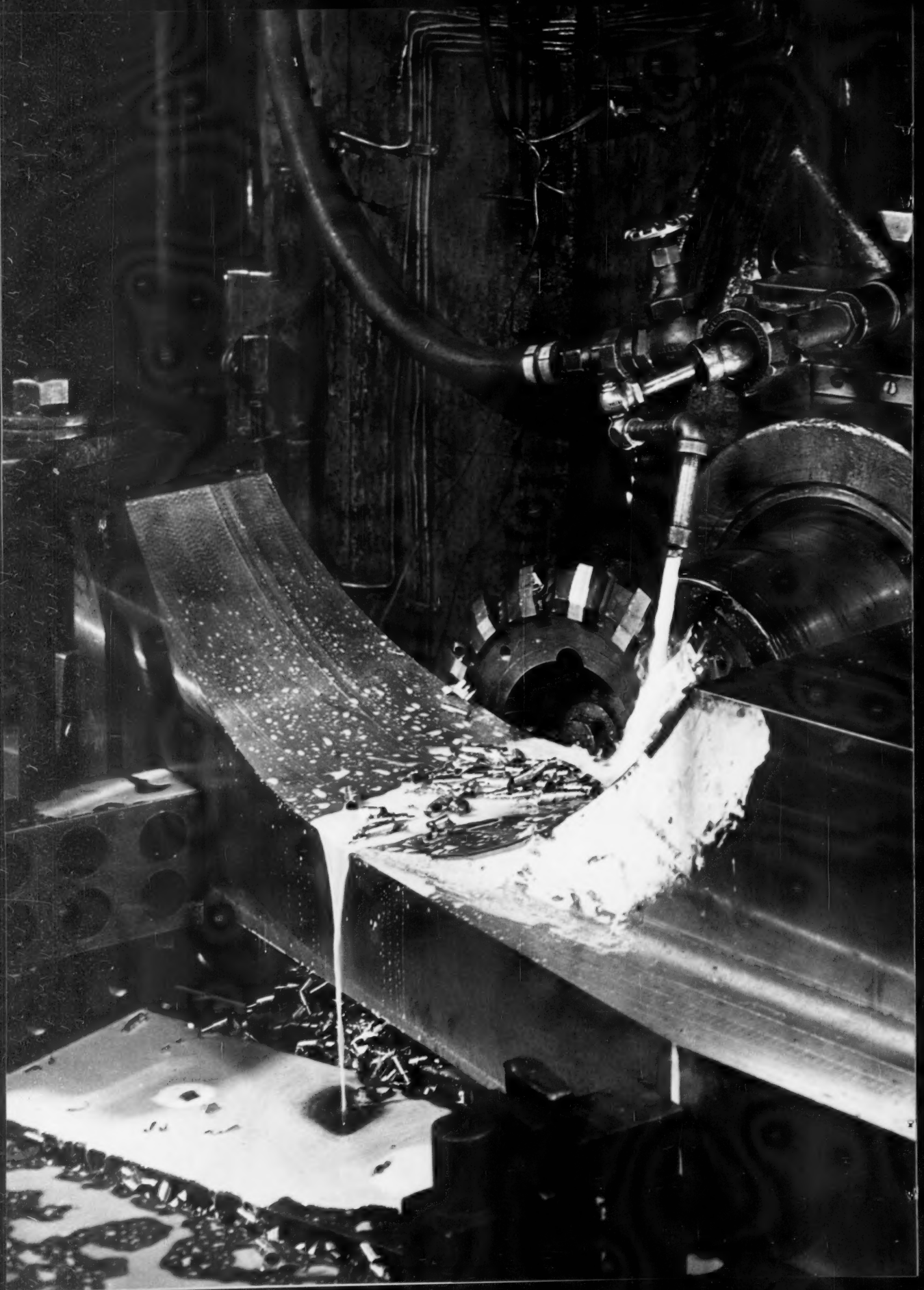

This forging may cradle the greatest source of energy on earth

One of the great scientific investigations of all time is now in progress, as we strive for a controlled *fusion* reaction. If we succeed, man will be able to generate a limitless amount of energy using deuterium fuel, a hydrogen isotope, available in inexhaustible quantities from the sea.

Princeton University carries on the study with their Stellarator-type experimental devices. The Model-C Stellarator Facility now nearing completion will cost $35 million and consists of an 8-inch-diameter, 40-foot-long, racetrack-shaped tube to control the reaction. Required ignition temperature is in the order of 100 *million* degrees. Any solid material will evaporate at that temperature, so the hot ionized gas will be confined in a magnetic field of *50,000* gauss in the Model-C Stellarator. The equipment is supported by USS Quality Forgings of Type 305 Stainless Steel.

Altogether, U. S. Steel supplied 17 of these stainless steel forgings, fully annealed, to Allis-Chalmers Manufacturing Company, major contractor for the new Model-C Stellarator.

The steel for the forgings was forged, heat-treated and machined at U. S. Steel's Homestead Plant. Each forging measures 60¼″ long, 21¼″ wide at the base, 15⅜″ high and weighs about 2,450 pounds rough machined.

United States Steel makes many forgings for the nuclear industry. Here, a team of *experts* supervises and *controls every step* of forging production. This same team can handle your forging requirements. If you would like additional information about USS Quality Forgings, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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USS

Have you sent for this FREE book and calculator?

Here is a new book, written in simple language, that describes the "Do's" and "Don'ts" in welding USS "T-1" Steel. Included in the booklet is a handy heat input circular computer that helps you choose the proper welding machine settings. Both will help every welder to do a more reliable job and make his work easier.

USS "T-1" Steel has become famous for three properties not usually found in a single steel: very high yield strength, excellent toughness and good weldability. The booklet will tell you how to weld "T-1" Steel successfully without affecting either its strength or toughness.

The information is based on the experience of our many field service men whose jobs are to help customers fabricate "T-1" Steel. It contains the results of nine years of work with hundreds of users, and shows how to apply common practices in the welding of "T-1" Steel.

As the booklet points out, welding of USS "T-1" Steel is not particularly difficult—but it is different than welding most other high-strength structural steels. To do it correctly requires some basic knowledge of the metal, of the electrodes, and the proper welding procedures.

We'll gladly send you enough free copies of the booklet for your weld shop personnel. Just send the coupon.

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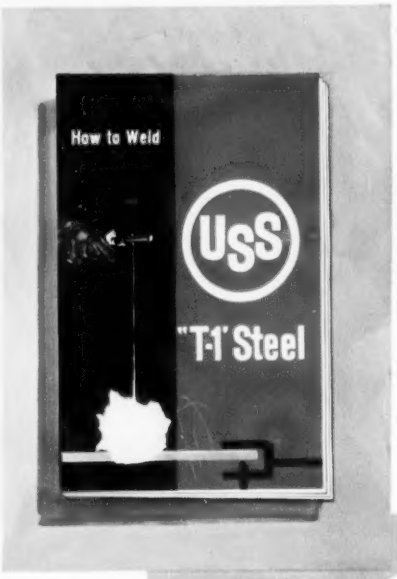

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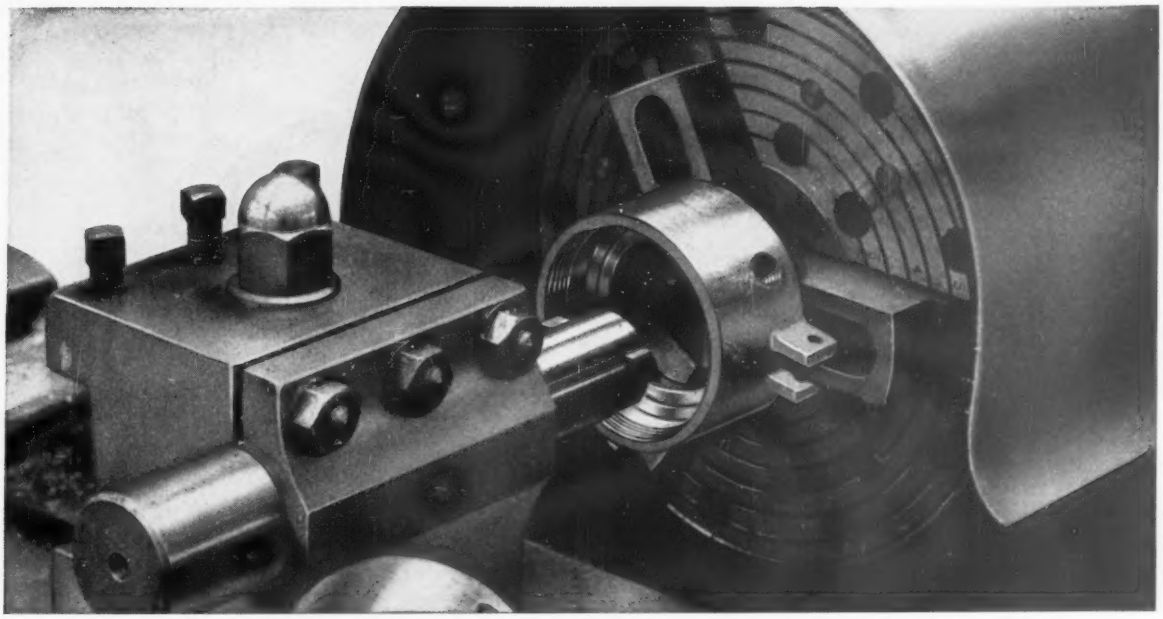


Threaded in just 6 seconds on a Gisholt CRI-DAN

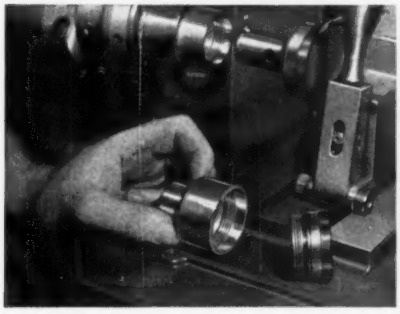
Here's a good example of what you can do on a Gisholt CRI-DAN Threading Lathe—an internal thread, 2 3/16" diameter x 1/4" long, 12 t.p.i., cut in a phosphor-bronze bearing housing in just six seconds.

Speed and versatility obsolete other methods.

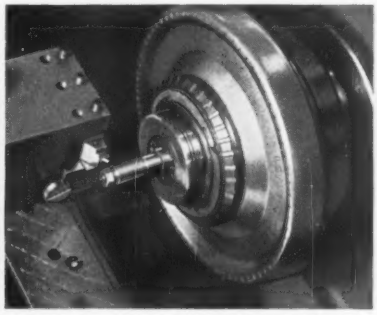
Note the other jobs shown—the variety of work and the fast threading times. Simple on a CRI-DAN—yet, each presented problems that could only be solved at high cost using any other method.

It's Cri-Dan for highest quality, lowest cost.

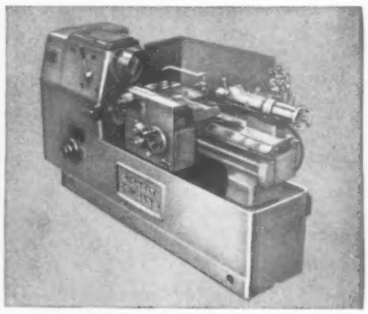
The jobs shown here prove that close tolerance and high-quality finish requirements are met easily on the CRI-DAN. The CRI-DAN method, using an inexpensive single-point carbide tool, is faster and less costly than thread grinding or thread milling.



20 seconds—Zoom operating sleeve for movie camera; aluminum; I.D. pilot dia. bored; tool indexed for threading a 2-start, .0625-pitch, .125"-lead, Class 4 16NS thread in the 1.610" center section.



15 seconds—spinning roller; stainless steel; 18 t.p.i. thread on 5/8" diameter for 7/8" length.



GET THE FACTS—NOW! Two models are available—both are capable of handling high-production work or a wide variety of short-run jobs. Change-over averages ten minutes. Write for our catalog—or ask your Gisholt Representative for complete details.

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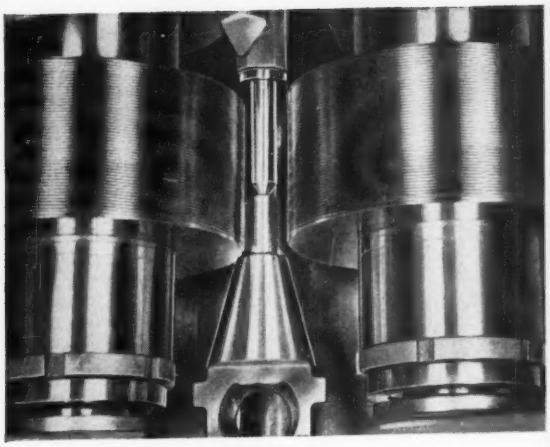
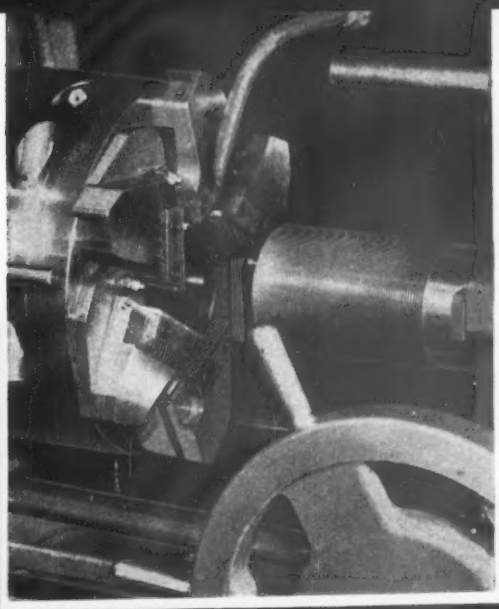
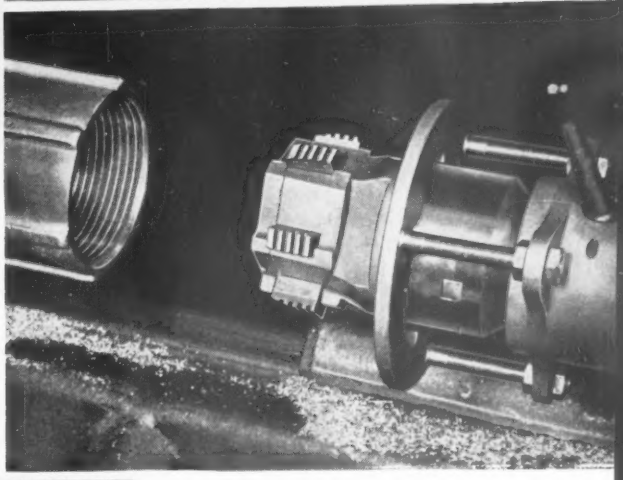
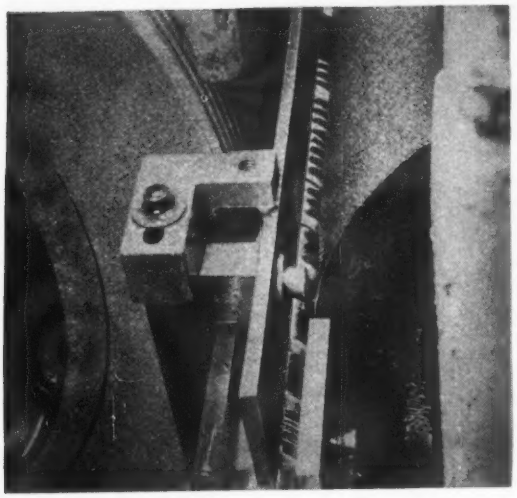






grinds threads



Cutting threads on double-end studs at Kilbourn Engineering Co., Milwaukee, Wisconsin

Rolling threads on jet engine mountings at Liston Grinding Co., Tonawanda, N. Y.

Tapping threads in cylinder retainer caps at Cleveland Hydraulic Co., Bedford Heights, Ohio

Grinding threads on worms at Bendix-Westinghouse, Elyria, Ohio

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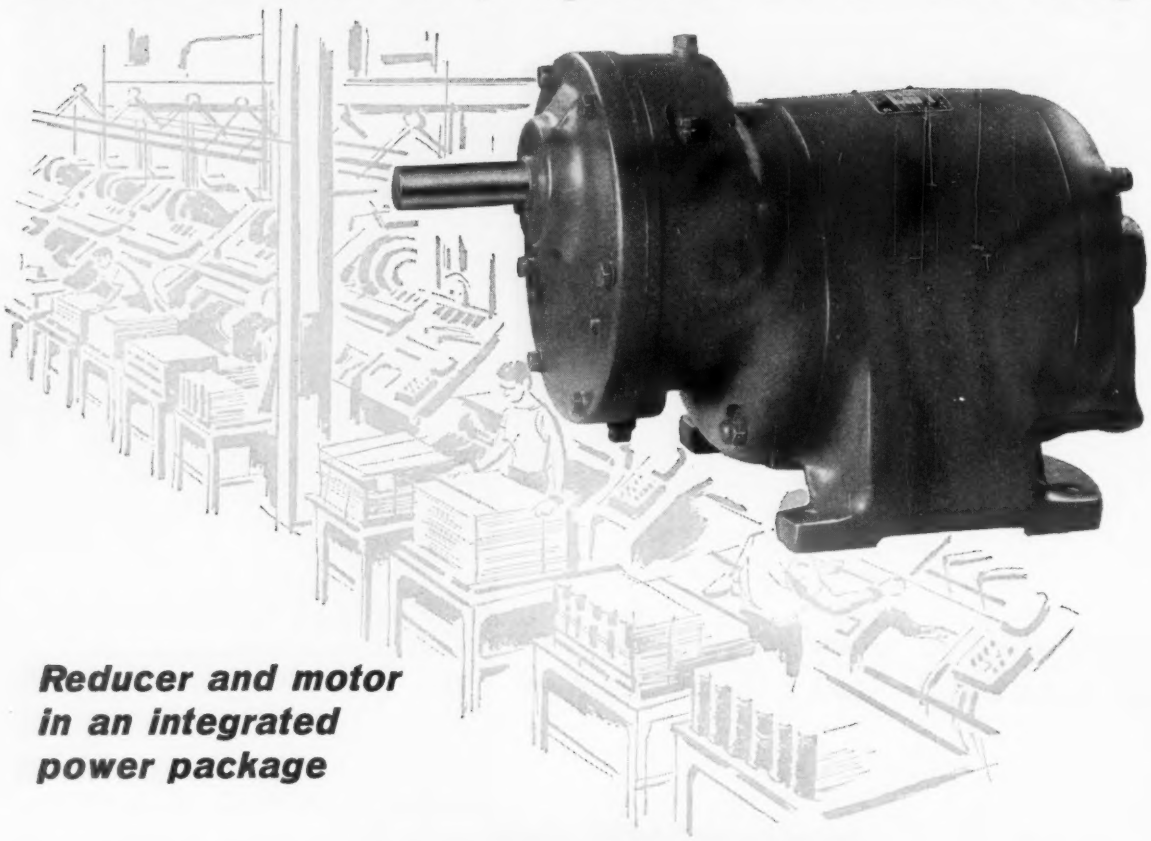

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Particularly suited to low speed applications, this Master Gearmotor gives you a highly efficient, self-contained unit that saves you money in a lot of ways:

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Master Gearmotors are available not only in open, enclosed and explosion-proof types, but can be supplied with an electrically operated Master Unibrake Motor—ideal where quick stopping or positive holding is necessary.

Ratings are from ⅛ to 125 hp.; reduction ratios up to 120:1. You get a maximum choice of mountings: vertical, horizontal or flange; fluid couplings are available for hard-to-start or cycling loads.

Your Reliance Sales Engineer can give you all the facts about the broad line of Master Gearmotors: parallel, and right angle, as well as in combination. Call the nearest Reliance office for application help, or write for price and rating information. E-1658

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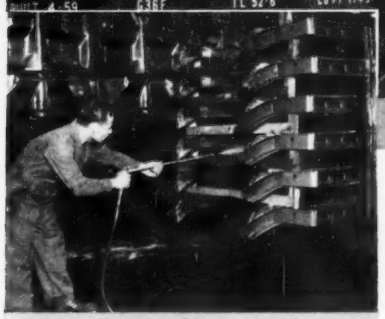
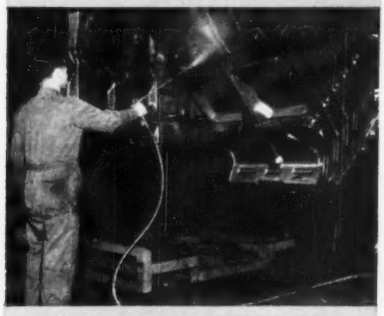
SPECIAL RUST PREVENTION PROBLEM:

protect *Rambler* underbodies in transit...

...Special Answer by OIL PRODUCTS



Rust preventive is sprayed on underbody bundles on loading dock. Note clean floor, small amount of absorbent required.



Carloading crane picks up bundle as sprayer covers bottom underbody. Thixotropic RP 252 gels on contact; does not run off.

Rust preventive is sprayed direct from drums through wide-angle spray nozzle. Last RP 252 goes on as bundle is lifted toward gondola car.

THE PROBLEM: Protect bare steel underbodies for up to two weeks outdoors in open gondola cars; keep rust preventive from running off on application; apply without fume hood or spray booth; make preventive quickly and completely removable; keep costs down.

THE SOLUTION: Frank Dreher, Budd metallurgist, Gary, Indiana, called on Nalco's Oil Products Division and other chemical suppliers for action. Oil Products developed RP 252, a thixotropic liquid corrosion inhibitor for this job. It is a high-flash-point, virtually colorless, odorless material that gels on contact with underbody metal. Spray coating at the loading platform is quick, clean, virtually fume-free. One man handles the entire operation; does not need protective mask or clothing.

THE RESULTS: Mr. Dreher (pictured left above with R. M. Kearns, Oil Products Sales Engineer) feels that the problem is solved satisfactorily. Rust prevention is complete; chemical costs are below previous material levels; substantially less oil-absorbent compound is required on floors in the spray area; American Motors removes RP 252 in an alkaline wash in one minute; and no residue remains to hamper welding or painting.

If you have rust prevention problems that need special skills and extra *willingness*, call on Oil Products . . . We would like to duplicate the Budd-American Motors results for you.

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NOW! ALUMINUM ETCHANT AT THE LOWEST COST EVER!

A new 600-lb. drum size and a new make-up technique now make Pennsalt's popular AE$_x$-16S Solid Aluminum Etchant a better buy than ever. AE-16S in economy-size drums gives you a clean, uniform etch . . . plus easier handling and better etchant performance . . . all at the lowest materials cost possible for a blended etchant!

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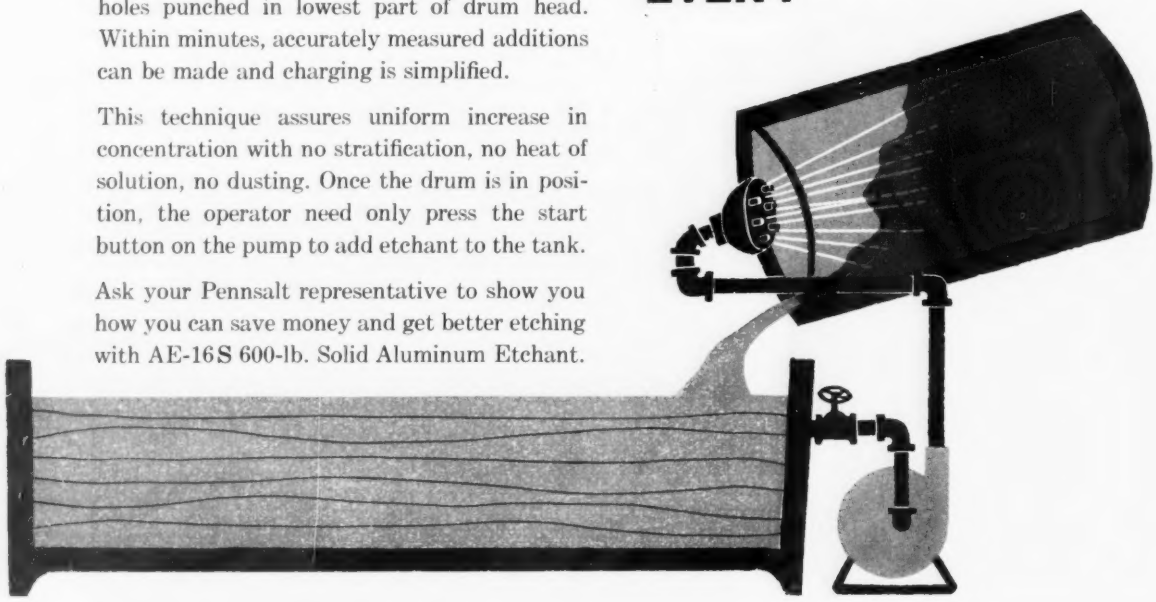
Ask your Pennsalt representative to show you how you can save money and get better etching with AE-16S 600-lb. Solid Aluminum Etchant.



Write for complete details on this new plan today. Be sure to check Pennsalt's other aluminum processing chemicals, including emulsion cleaners, inhibited alkaline cleaners, deoxidizing cleaners, flake etchants—sold and serviced by our nationwide organization.

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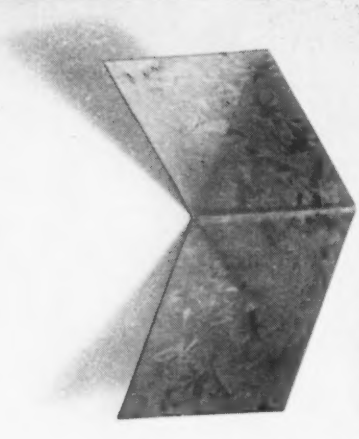
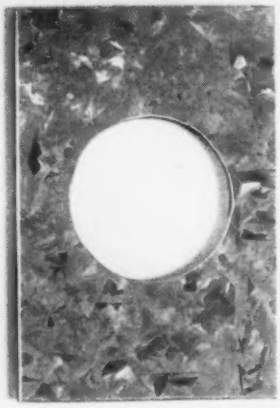


...bend it

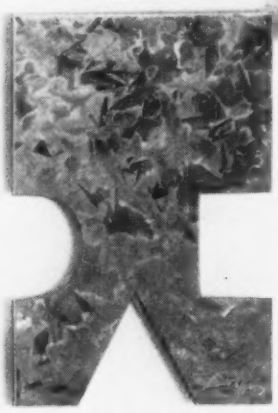
...hem it

...scribe it



...punch it

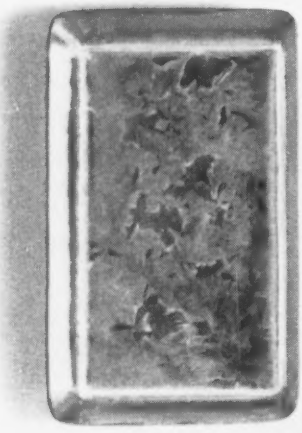
...form it



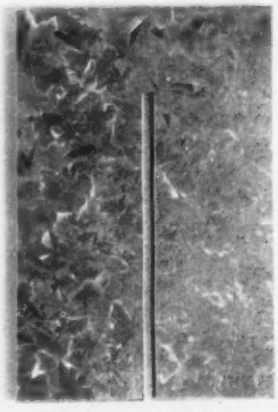
...notch it

...lock it

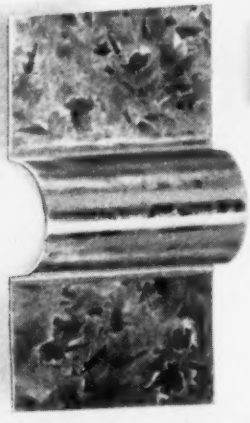
...snip it



...draw it



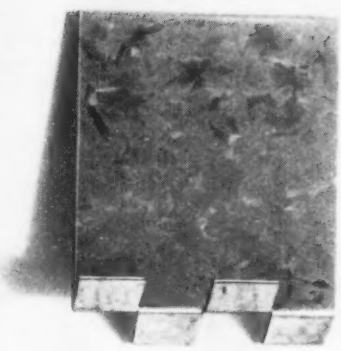
...saw it



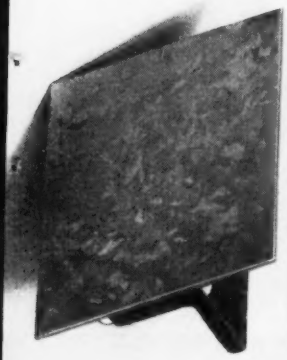
...stamp it

...shear it

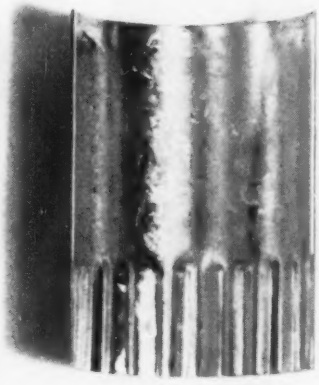
...seam it



...dovetail it



...weld it



...crimp it

...slit it

...wire it

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Steel

How George Deickert upped grinding

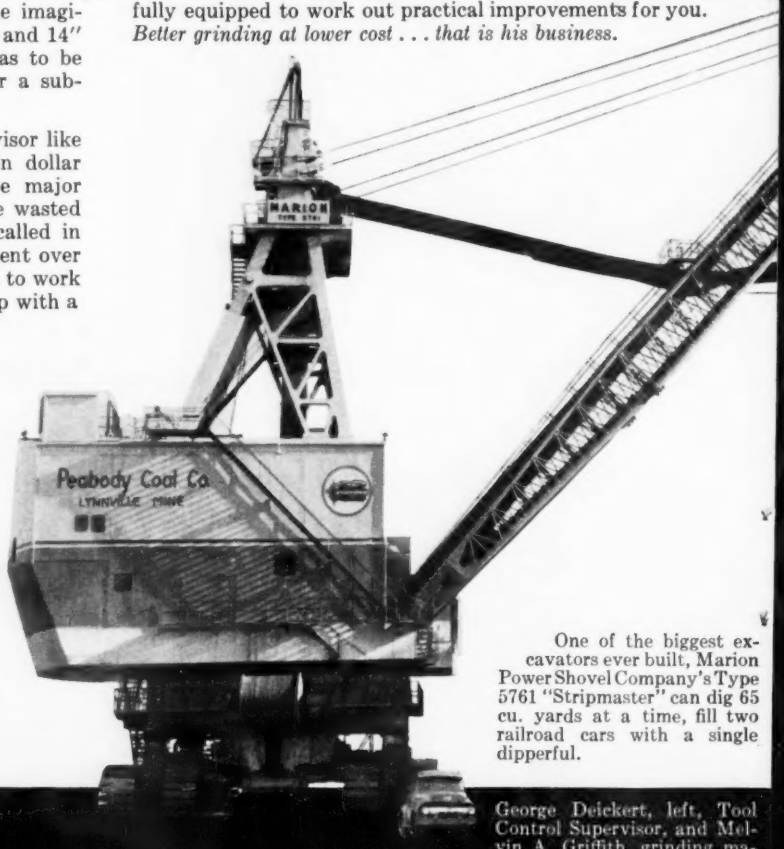
Watchmakers have nothing on the builders of Marion power shovels as far as accuracy is concerned. Some of the shafts on Marion's biggest shovel (two full carloads in a single scoop!) have to be finished to a tolerance of ±.0004" on bearing surfaces.

The sheer size of these grinding jobs staggers the imagination too. The steel shafts run up to 12 ft. long and 14" in diameter so a tremendous amount of metal has to be removed and the grinding operation accounts for a substantial chunk of costs.

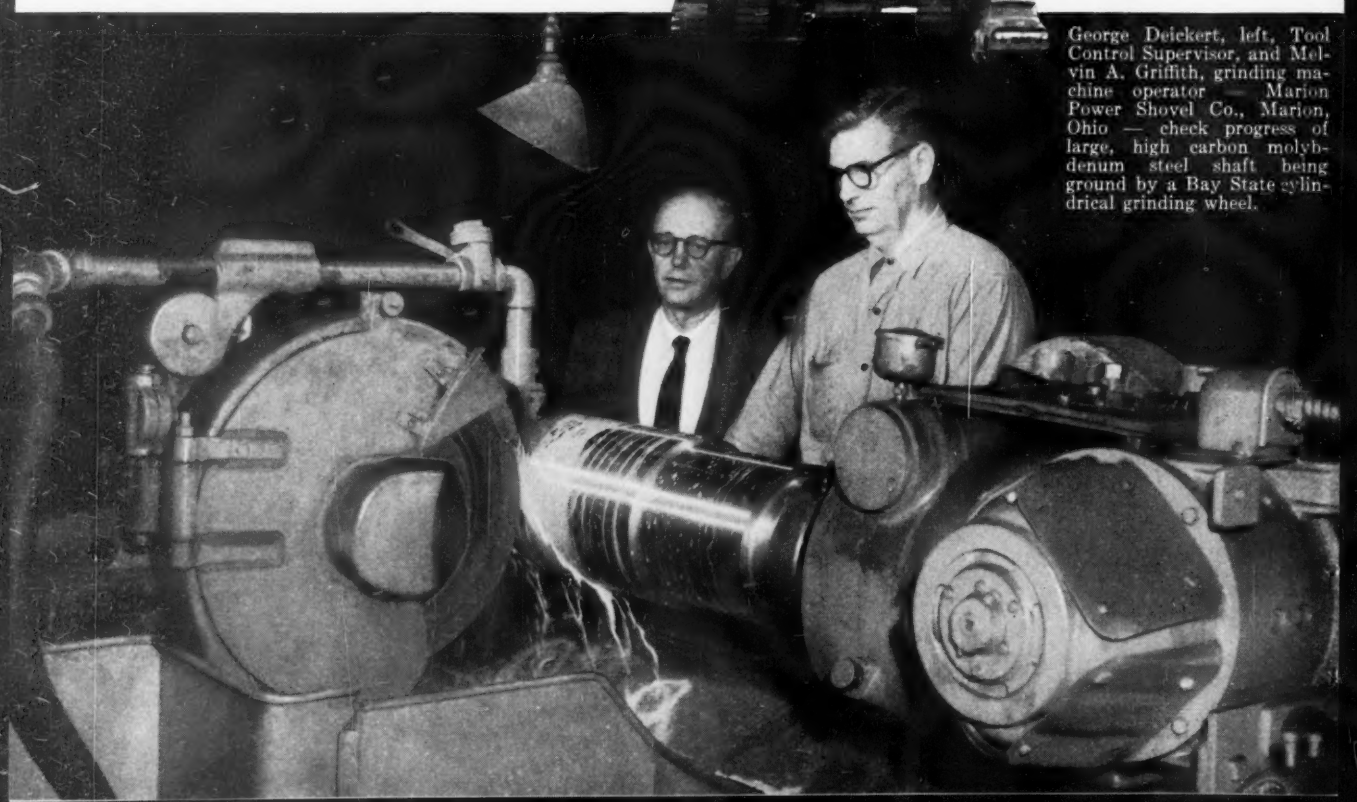
That's where an outstanding Tool Control Supervisor like Marion's George Deickert is worth his weight in dollar bills. His analysis of the situation showed five major deficiencies in the wheels used for the job and he wasted no time turning dissatisfaction into action. He called in Bay State Abrasive Specialist Dick Crofoot and went over the whole problem with him in detail. Crofoot went to work with the engineering staff at Westboro and came up with a specification that did both grinding and finishing *and* ensured: (1) 30% faster stock removal. (2) Excellent instead of poor size control . . . *easily within* the ± .0004" tolerance. (3) Consistent finish at 20 RMS. (4) 50% less dressing. (5) Greatly improved wheel life. (6) Consistent duplication of performance, wheel after wheel.

As George Deickert himself says: "This isn't the only job that Bay State has done well on for us. We have dozens of different types of grinding jobs . . . and we use a great many different types of wheels, including tool wheels. Bay State not only does a lot of jobs for us and does them well . . . they have also been able to duplicate excellent first performances with their follow-up wheels."

If your grinding operations . . . large, small or micro-miniature . . . are less than 100% efficient by current standards of abrasive technology, your Bay State distributor or direct representative is thoroughly trained and fully equipped to work out practical improvements for you. *Better grinding at lower cost . . . that is his business.*



One of the biggest excavators ever built, Marion Power Shovel Company's Type 5761 "Stripmaster" can dig 65 cu. yards at a time, fill two railroad cars with a single dipperful.



George Deickert, left, Tool Control Supervisor, and Melvin A. Griffith, grinding machine operator — Marion Power Shovel Co., Marion, Ohio — check progress of large, high carbon molybdenum steel shaft being ground by a Bay State cylindrical grinding wheel.

speed 30% and cut dressings by 50% at MARION POWER SHOVEL

George Deickert's background is impressive to put it mildly. His technical training started in Germany with a Masters Degree in steam and combustion engineering from Berlin University. His business career includes hitches with United Carbon Co., and Weston Instrument Co., in Newark, N. J. and fifteen years with Curtiss-Wright in Patterson, N. J. Starting as a Methods Engineer, he's been with Marion Power Shovel since 1947. He has used Bay State wheels since 1932 and says they have never let him down.

BAY STATE ABRASIVES

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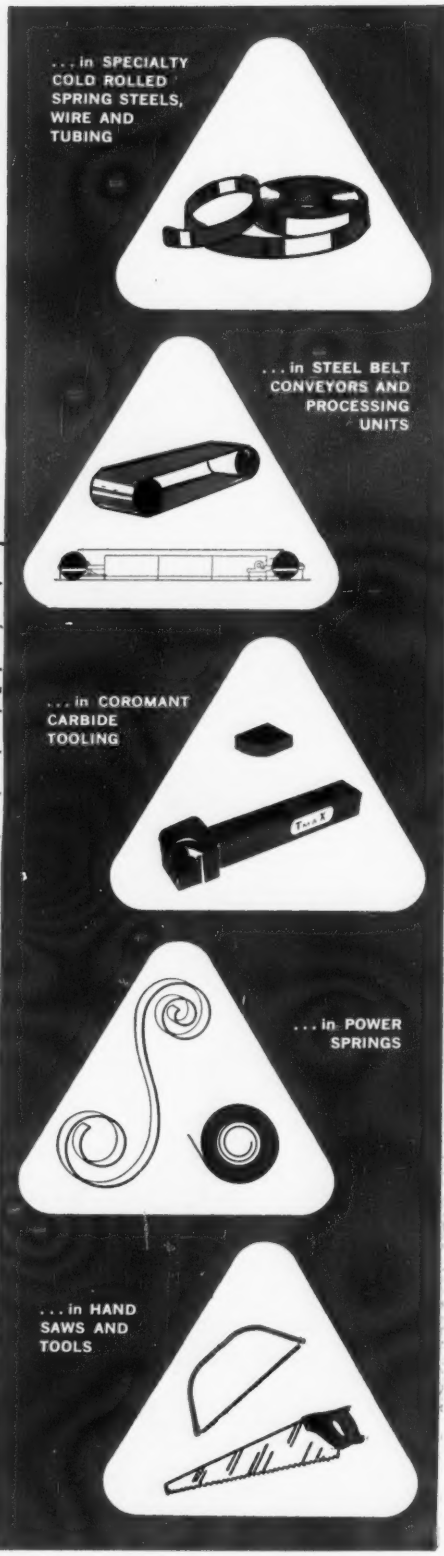
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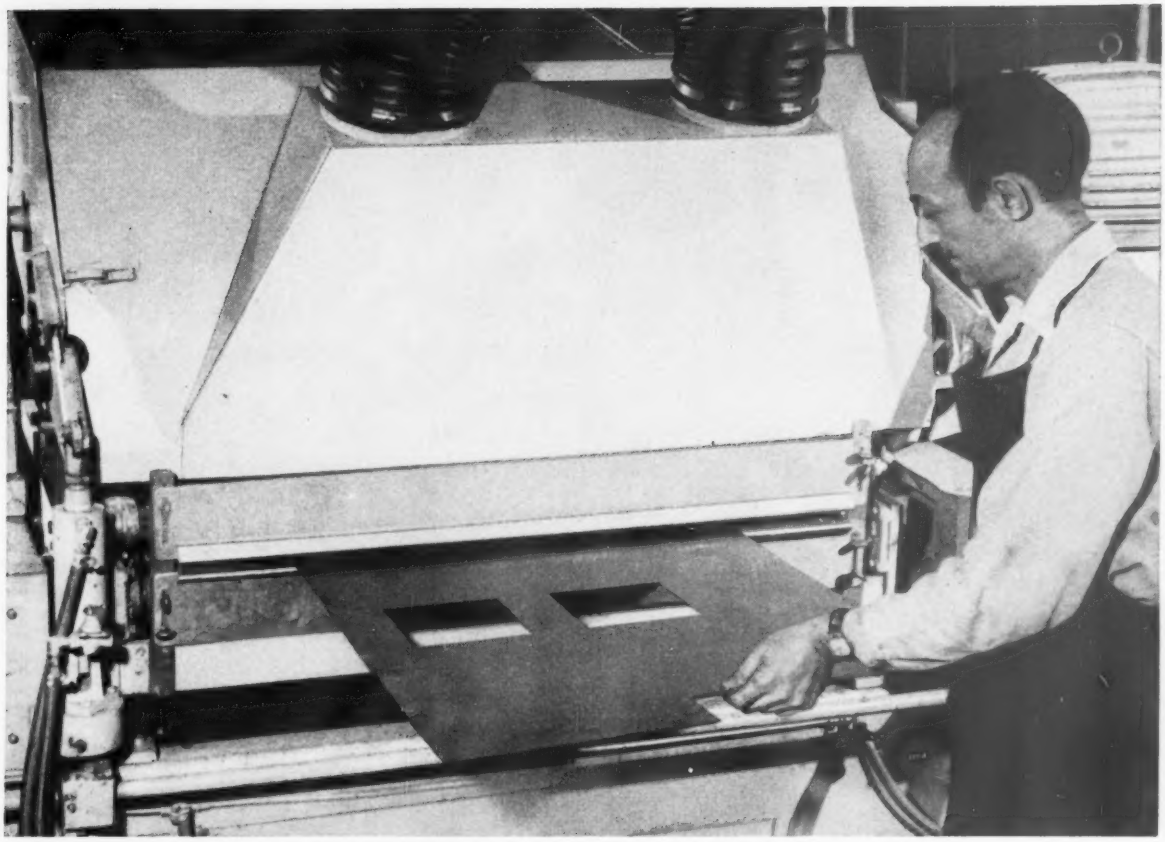

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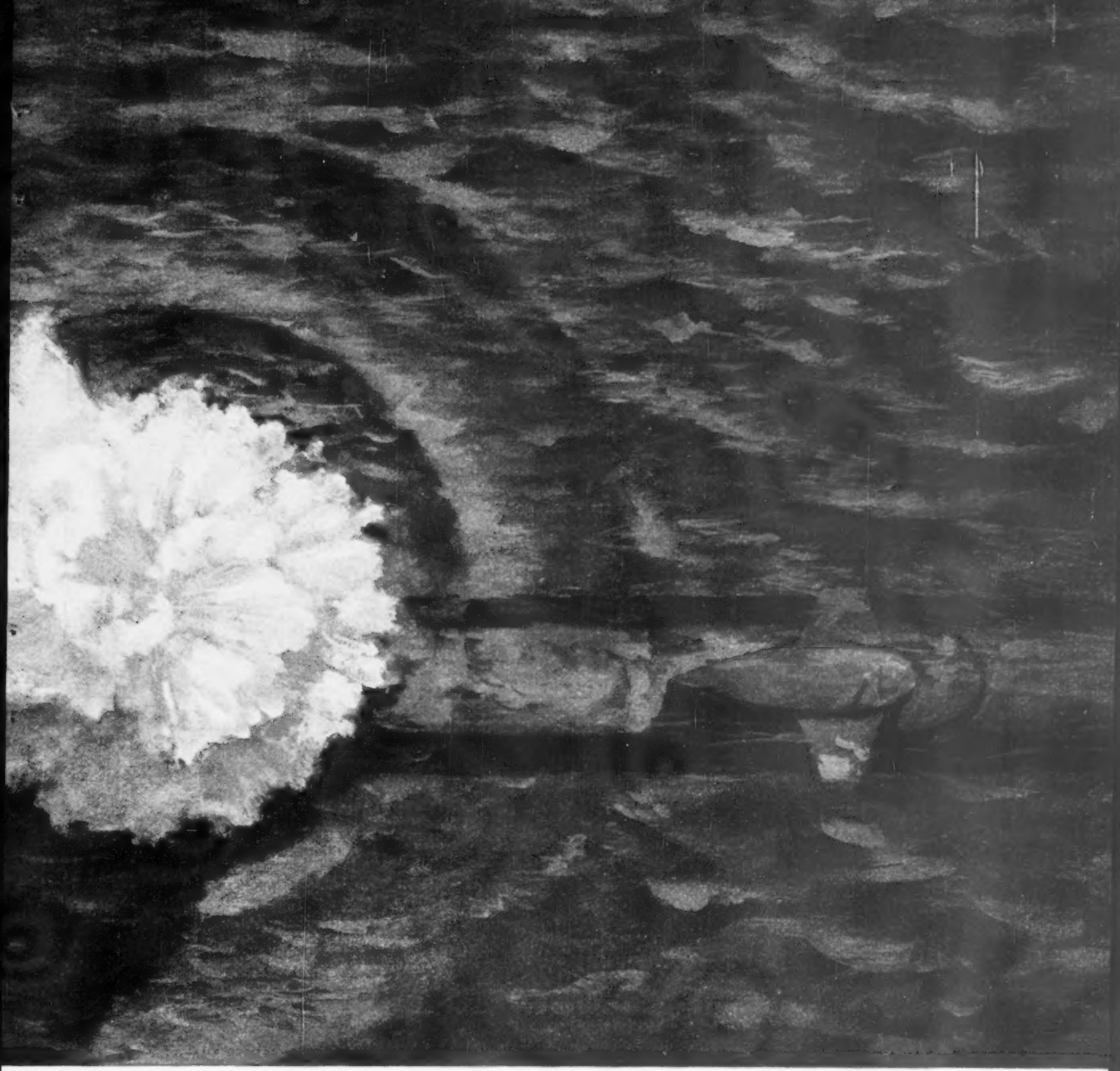
On January 8, 1790, the First President of the United States said, "To be prepared for war is one of the most effective means of preserving peace."

This mark tells you a product is made of modern, dependable Steel.

The USS George Washington, built by Electric Boat Division, General Dynamics Corporation, is the Navy's first mobile ballistic missile base. Cradled inside its steel hull will be 16 business-like Polaris missiles. This new, atomic-powered submarine dives or surfaces as gracefully as a porpoise and it speeds along in excess of twenty knots.

The Polaris Fleet Ballistic Missile (FBM) will be a deterrent weapon. It has a range of 1,200 miles, and travels at speeds up to 10,000 mph. Approximate time from submarine to target: less than 20 minutes.

Compressed air will eject the Polaris. The missile's solid-fuel engines ignite with a roar as it leaps clear



of the water. This new launching method protects the sub from rocket back-blast, and makes it possible for the George Washington to pump a full load of these nuclear-armed missiles into target in minutes.

As part of the Navy-industry team that developed the Polaris and the George Washington, National Tube supplied USS National Seamless Pipe and Tubes, in both carbon and stainless steels, and USS National Seamless Steel Cylinders for air and oxygen systems. If you have a problem related to the field of pipe, or tubular applications, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. *USS and National are registered trademarks*

National Tube
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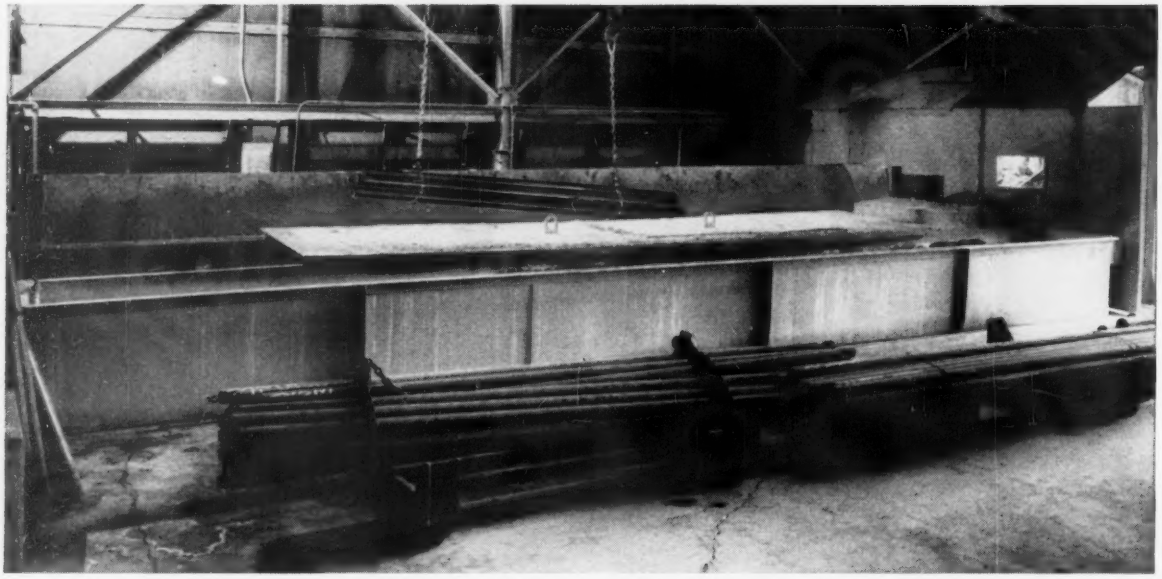
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

THE TIMKEN COMPANY CUTS DESCALING TIME



FROM 90 MINUTES TO 30 MINUTES

How Virgo® Descaling Salt gives faster, safer cleaning.

It used to take as much as ninety minutes of straight acid pickling to descale these stainless steel tubes at the Gambrinus Works of The Timken Roller Bearing Company.

Since switching to Virgo Descaling Salt, The Timken Company reports that descaling cycles have been cut down to *one-half* hour with actual acid pickling time reduced to 10 minutes. Equally important too, is the improvement in surface quality.

In the same bath, which handles bundles up to 37 feet in length, the tubes are degreased.

Get these other Virgo advantages in your descaling:

Besides stainless and alloy steels, Virgo Descaling Salt descales titanium and its alloys. You can even handle both types of metal in the same bath.

Virgo Salt reacts only with scale. There's no loss of base metal, no pitting or etching. There's no danger of hydrogen embrittlement.

The Virgo bath is safe and simple to operate, using normal precautions. Bath temperatures run from 800 to 1250°F.

You can descale strip, sheet, bars, wire, tubes, castings, or any other form to a chemically clean surface.

You use much less acid with the Virgo process.

For more information on how Virgo Descaling Salt works, write for Bulletins 25 and 25-T (Titanium).

Help for your other metal cleaning operations.

Desanding. Use Virgo Electrolytic Salt to remove sand, graphite, other impurities—produce a chemically clean surface.

Reclaiming parts loaded with carbon or rust. Virgo Molten Cleaner works fast—is the quick answer for large-scale salvage operations.

Vapor degreasing. You get unique stability—degrease more parts between cleanouts—using Nialk® *Trichlor*ethylene with *psp* (permanent staying power).

Stripping, acid neutralizing. You can get Hooker caustic soda in four convenient flake sizes, in new easy-to-empty drums with 18" openings.

Acid cleaning, pickling. You can get Hooker muriatic acid in 4,000-, 6,000- or 8,000-gallon tank cars.

Plating with tin-zinc, tin, silver, copper. Get the benefit of more than 50 years' experience in potash production, when you specify Nialk® caustic potash for your plating operations.

For literature on any of these Hooker chemicals for metals, just write us on your business letterhead.

HOOKER CHEMICAL CORPORATION

1210 Union Street, Niagara Falls, N. Y.

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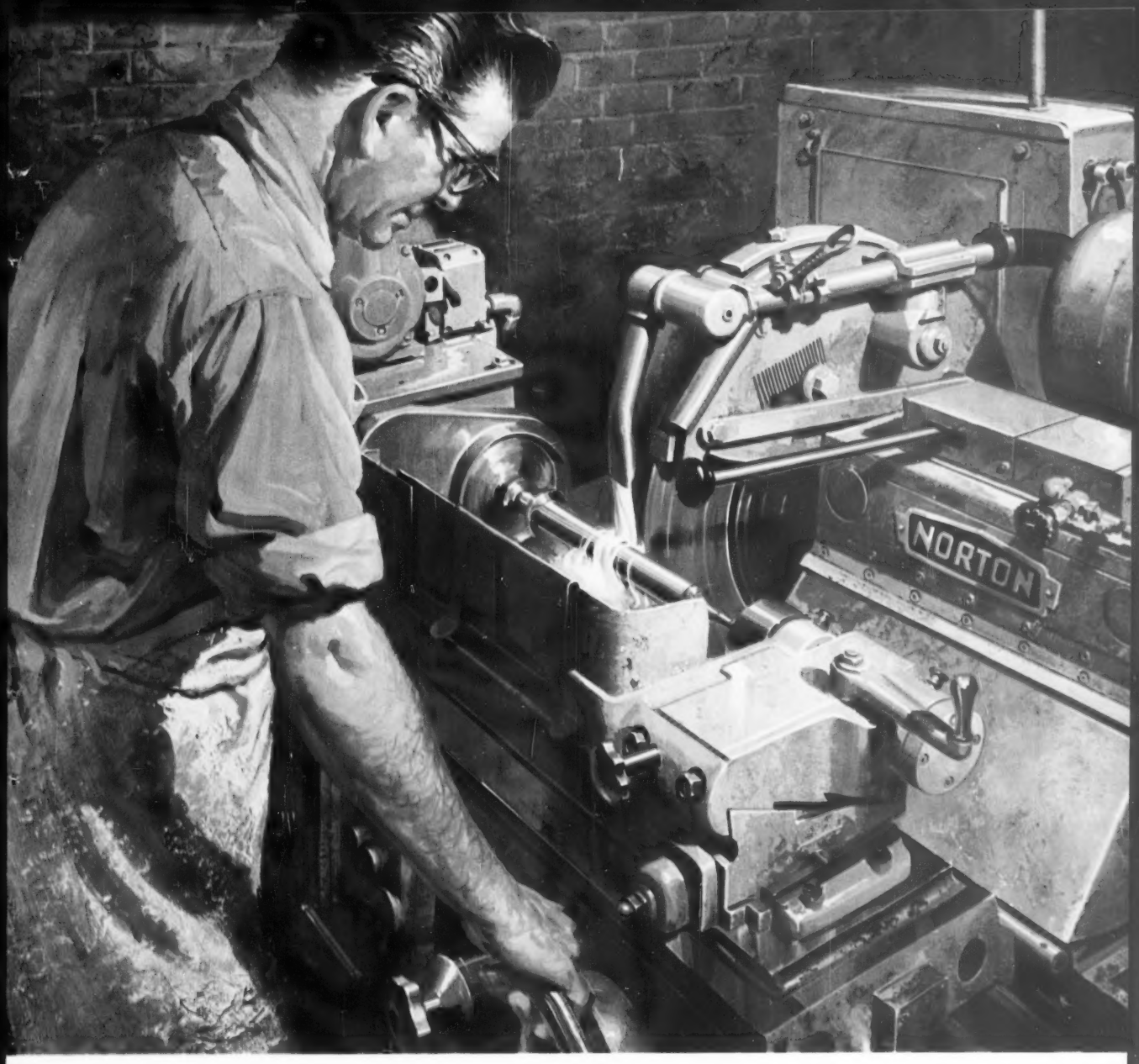
Sales Offices: Chicago, Ill.; Detroit, Mich.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B. C.



Adding the "Touch of Gold" all around

He's finishing a shaft with the two best tools — a Norton grinding wheel on a Norton cylindrical grinder.

In O.D. grinding as in every other type, choosing your wheels calls for just as much care as choosing your machines. New manufacturing techniques, combined with improved bonds, provide excellent structural uniformity and the best-balanced wheels in the industry. So, remember that Norton O.D. wheels are engineered to add the product-improving, cost-cutting "Touch of Gold" all the way 'round any cylindrical workpiece.

Get these "Touch of Gold" benefits working in your production. Your Norton man, a trained Abrasive Engineer or your Norton Distributor will be glad to tell you how. NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

NORTON
ABRASIVES

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Save Eyes . . . Save Money!

(and worker skills)

Up to $100,000 and more yearly for Larger Companies.
(Case histories show these savings are possible)

Meet "DURA Safe"

New Milestone in Eye Protection by AO

Ask your safety director about Durasafe — new and great line of American Optical safety glasses! By protecting your workers with this equipment — engineered for safety with unexcelled fitting qualities — glasses that are comfortable, willingly worn, *eyes will be saved and dollars, too — in four, five and even six figures.* Remember the *indirect* costs of eye accidents are about 4 times the direct costs. Give your workers the best — Durasafe!

AO DURASAFE
with black on crystal
(F9800BC)

AO DURASAFE with aluminum spatula temples and "Smoke" Frame. Cat. No. F9800S.

A few of the important high quality features

- New 7 Barrel Hinge — 40% increase in strength at the most vulnerable spot — where frame and temple are joined
- Duragrip Screw Construction — Keeps frame temples tight **permanently,** screws can't fall out
- Wider frame temples — Stronger (minimizes breakage), better appearance, more comfort, conform better to head contour
- "Lock-A-Lens" — New safety ridge locks lens in frame — locks trouble out
- "Breeze Catcher" — New safety and comfort in non-reflecting mesh side shields
- Sturdier frame — more massive for extra strength
- Available in six basic models: Smoke, Mahogany and Pink Crystal plastic frames and 2-tone combinations

Always insist on AO Trademarked Lenses and Frames

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

Your Surest Protection...AO SURE-GUARD Products

Photo courtesy Butler Mfg. Co., Galesburg, Illinois

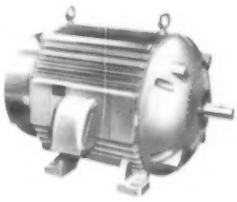
FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN METAL FABRICATION . . One man in the cab of this P&H overhead crane keeps several slitting and roll-forming machines supplied with coils of metal for continuous production. In addition, he spots incoming coils in proper storage areas as they arrive from the mills.

This manufacturer of standardized commercial buildings gets full use of plant floor area by moving materials through the air. The P&H crane and special coil-handling hook eliminates the "dead" aisle space needed with floor-operated equipment. It also saves manpower, and the safe, precision handling reduces damage to finished stock.

As with every Harnischfeger installation, this long-span (87') crane is specially engineered to consider all factors that may affect operation on this particular job. Special problems are taken in stride, integrated into the overall design. Only this kind of integrated engineering can give you performance that's never in doubt, performance P&H crane users have relied on for over 76 years! Why not find out more about P&H "job-engineered" cranes? Write for bulletin C-42, Department 124, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

All P&H motors are built specifically for crane service—not adapted to it! P&H engineers have designed extra ruggedness into every part for maximum efficiency under the most severe conditions of fast acceleration, frequent reversals, and repeated shock loads. Thousands of P&H crane motors in every-day use prove that they give years of trouble-free service with minimum maintenance.



P&H
OVERHEAD CRANES

HARNISCHFEGER
Milwaukee 46, Wisconsin

SPACE AGE MARGIN FOR ERROR – ZERO!

This P&H Zip-Lift® hoist carefully lowers a computer unit for a missile inertial guidance system into its special shipping container. Fast, safe, handling is vital with intricate assemblies like this. That's why so many component manufacturers depend on P&H Zip-Lift wire rope hoists. There is never any doubt about safety, reliability, or positive control.

You may not handle missile components, but isn't fast, safe, dependable, precision lifting and spotting just as important to uninterrupted production in your plant? If so, it will pay you to find out more about the P&H Zip-Lift's quality design features — dual brakes, 24-volt controls, shaved gears running in oil, permanently lubricated bearings, just to name a few.

Best of all, the price is down low enough to make a purchasing agent smile! Write for bulletin H-20, Department 226, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

P&H
ZIP-LIFT HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

Order ALCOA ALUMINUM FASTENERS from your Yellow Pages!

. . . save time and money

It's a fact. In the Yellow Pages of your phone book you'll find a local distributor of Alcoa® Aluminum Fasteners. He maintains full stocks—aluminum bolts, nuts, rivets, machine screws, wood screws, sheet metal screws, washers, any aluminum fastener you need.

No need to stock a lot of fasteners yourself. No need to run short, either. Your local Alcoa distributor offers the largest line of aluminum fasteners available today. So, besides the *other* advantages of using Alcoa Aluminum Fasteners—to cut your production costs, and improve product appearance, and boost product performance—you can simplify your inventory control.

Alcoa Aluminum Fasteners are corrosion resistant, have full threads, no burrs, and are produced from fully heat-treated, high-strength alloys. And one thing more! You'll get *full count* every time, exactly what you order.

If you'd like more information or free samples, mail the coupon!

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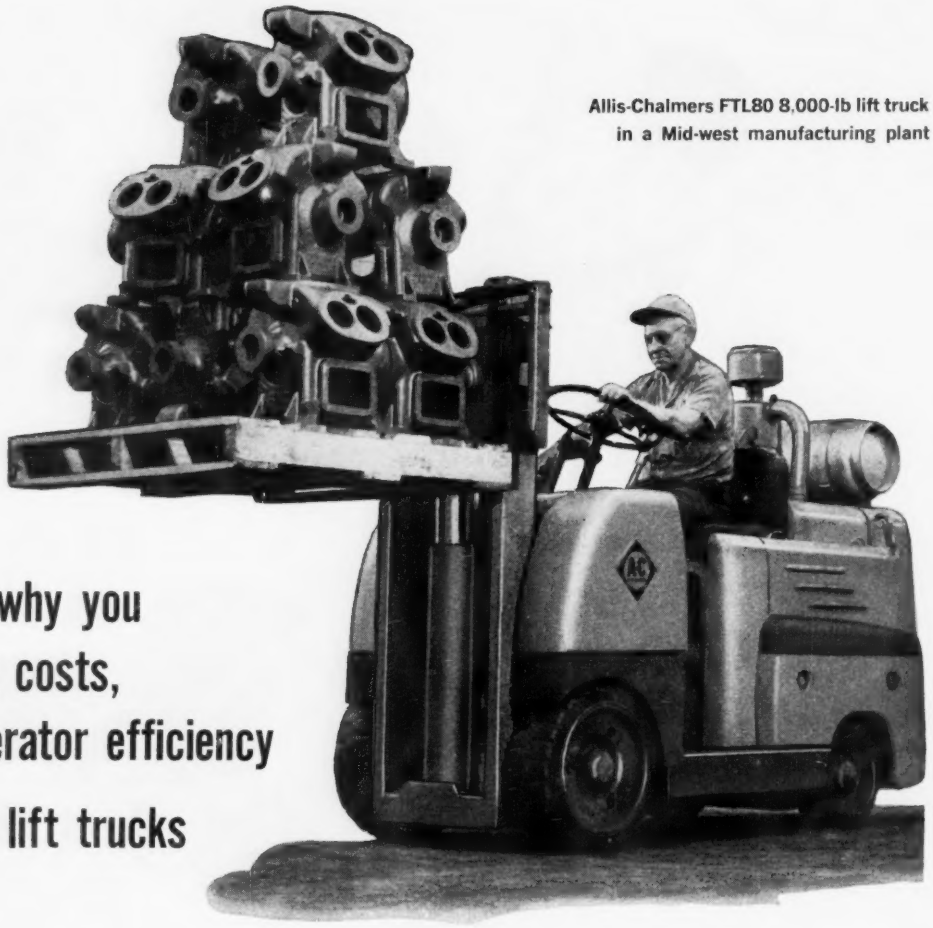


Allis-Chalmers FTL80 8,000-lb lift truck
in a Mid-west manufacturing plant

10 reasons why you cut handling costs, increase operator efficiency with A-C lift trucks

1. Better performance, indoors or out, with heavy-duty Allis-Chalmers industrial engine.
2. Built for rough yard conditions. Rigid, deep-section steel frame takes stresses, holds parts in alignment.
3. Excellent balance of power and weight design permits outstanding gradability and stability.
4. Faster travel speeds match your job requirements.
5. Choice of standard transmission or two-speed POWER-SHIFT torque converter drive to fit your needs.
6. Operator works in comfort. Cushion seat is adjustable for leg room.
7. Choice of masts, plus many interchangeable attachments to fit your requirements.
8. There is extra reserve of electrical power for cold-weather starting, other needs, with 12-volt system.
9. New steel hydraulic lines eliminate chafing and vibration wear.
10. Less downtime because of outstanding ease of servicing and accessibility.

Let your dealer show you these and many other features of the better-than-ever Allis-Chalmers lift trucks.

Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS
***POWER* FOR A GROWING WORLD**

BH-151C

Another example of National Roll quality control

National's Deac Scholl, sales manager, and Bill Curran, works manager, talk rolls by one of the largest ever cast, a 38½x160" plate roll.

We "live" with your rolls after shipment, too

National Roll has only one business: rolls. This product concentration has enabled National to build a sales, service and production staff with specialized knowledge of roll making. Experienced men give every roll order placed with National "personalized" attention, all the way from consultation with the customer before the order is placed to follow-up on the roll's performance throughout its service life.

This emphasis on customer service is one reason for the confidence so many steel makers are placing in National as a supplier of steel, nodular iron and cast iron rolls.

A new brochure entitled "This is the New National Roll" explains many more of National's unique advantages as a roll supplier. We will be glad to send you a copy. It shows you why . . .

National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

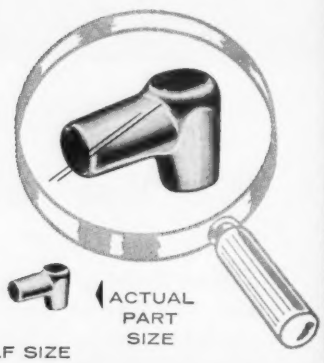
MUELLER BRASS CO. PRODUCES

SPECIFICATIONS . . . *REGARDLESS OF*

To obtain the desired physical and design requirements in a part at the lowest cost, there is usually one specific process by which that part can be most successfully and economically manufactured. Because the Mueller Brass Co. offers a variety of production methods, you get sound engineering, accurate production method analysis, our assurance of getting the best product at the lowest cost . . . regardless of metal specified or the size of your particular part.

BRASS, BRONZE, ALUMINUM FORGINGS

The two parts shown here dramatically illustrate the ability of the Mueller Brass Co. to produce precision forgings regardless of size or configuration. Both the tiny dental drill nozzle and the big heat exchanger shell hub, which is the largest of its kind ever produced, were forged to exacting specifications. The weight of the nozzle is only a few ounces while the shell hub weighs 40 lbs., and has a forged pocket 7 1⁵⁄₁₆″ in diameter and 4³⁄₁₆″ deep. By way of size comparison, the pocket is big enough to hold over 14,000 of these tiny drill nozzles. By forging the pocket, considerable machining time and money was saved. The sound, dense structure of the shell hub makes it ideal for the high pressure application for which it was designed. The forging not only does the job better, but was produced for 25% less than the casting it replaced. Experience makes it possible for the Mueller Brass Co. to produce high quality precision forgings regardless of specifications . . . why not put this experience to work for you?



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ONE DEPENDABLE

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POWDERED METAL PARTS

MUELLER BRASS CO.

PARTS ECONOMICALLY...TO EXACT

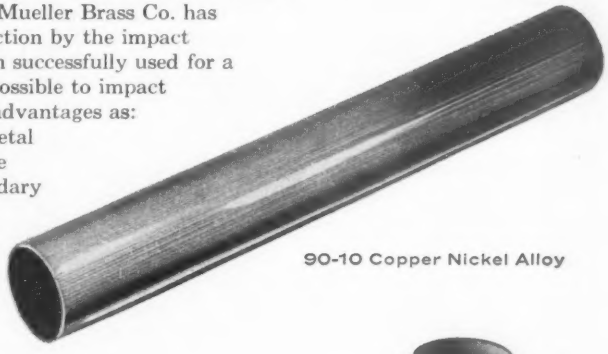
METAL, METHOD OR SIZE...

When you are designing, specifying or purchasing fabricated parts, call in the "Man From Mueller Brass Co." to help lower costs and improve your products. Sales and engineering service is available to you at Mueller Brass Co. offices throughout the United States. Make Mueller Brass Co. your one dependable source for all your part needs.

COLD PREST® IMPACT EXTRUSIONS

Today, because of vast experience in alloys, the Mueller Brass Co. has greatly expanded the possibilities of parts production by the impact extrusion method. Aluminum, of course, has been successfully used for a multitude of tubular shapes. But now it is also possible to impact parts of copper alloys incorporating such major advantages as: closer tolerances, better finish and appreciable metal savings. Because of dimensional accuracy possible with the impact extrusion, the necessity of secondary machining operations is often eliminated.

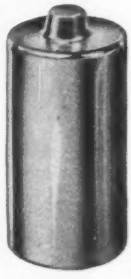
The parts shown here are representative of the group now being economically produced as impact extrusions by the Mueller Brass Co. who offer complete engineering and design service in the development of new parts from copper base alloys.



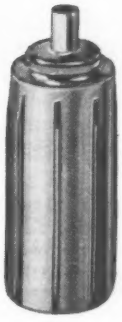
90-10 Copper Nickel Alloy

Aluminum Alloy 6061

Oxygen Free High Conductivity Copper



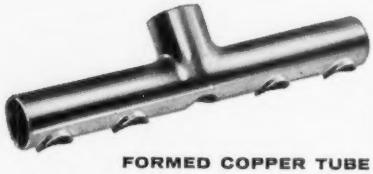
Special Alloy 902



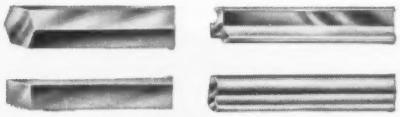
Tellurium Copper Alloy

Low Phosphorus Copper Alloy

SOURCE FOR ALL THESE OTHER PRODUCTS



FORMED COPPER TUBE



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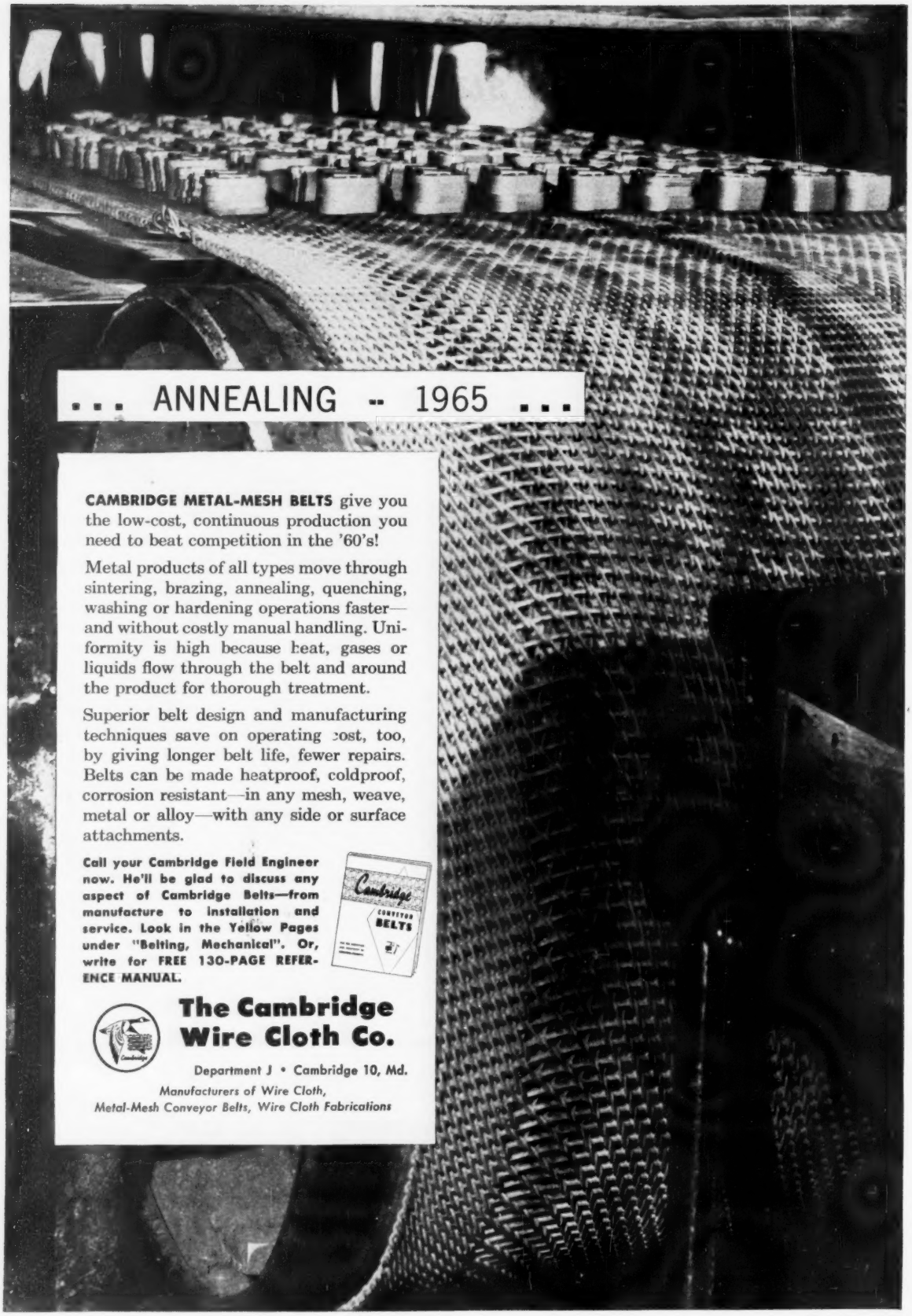

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Call your Cambridge Field Engineer now. He'll be glad to discuss any aspect of Cambridge Belts—from manufacture to installation and service. Look in the Yellow Pages under "Belting, Mechanical". Or, write for FREE 130-PAGE REFERENCE MANUAL.

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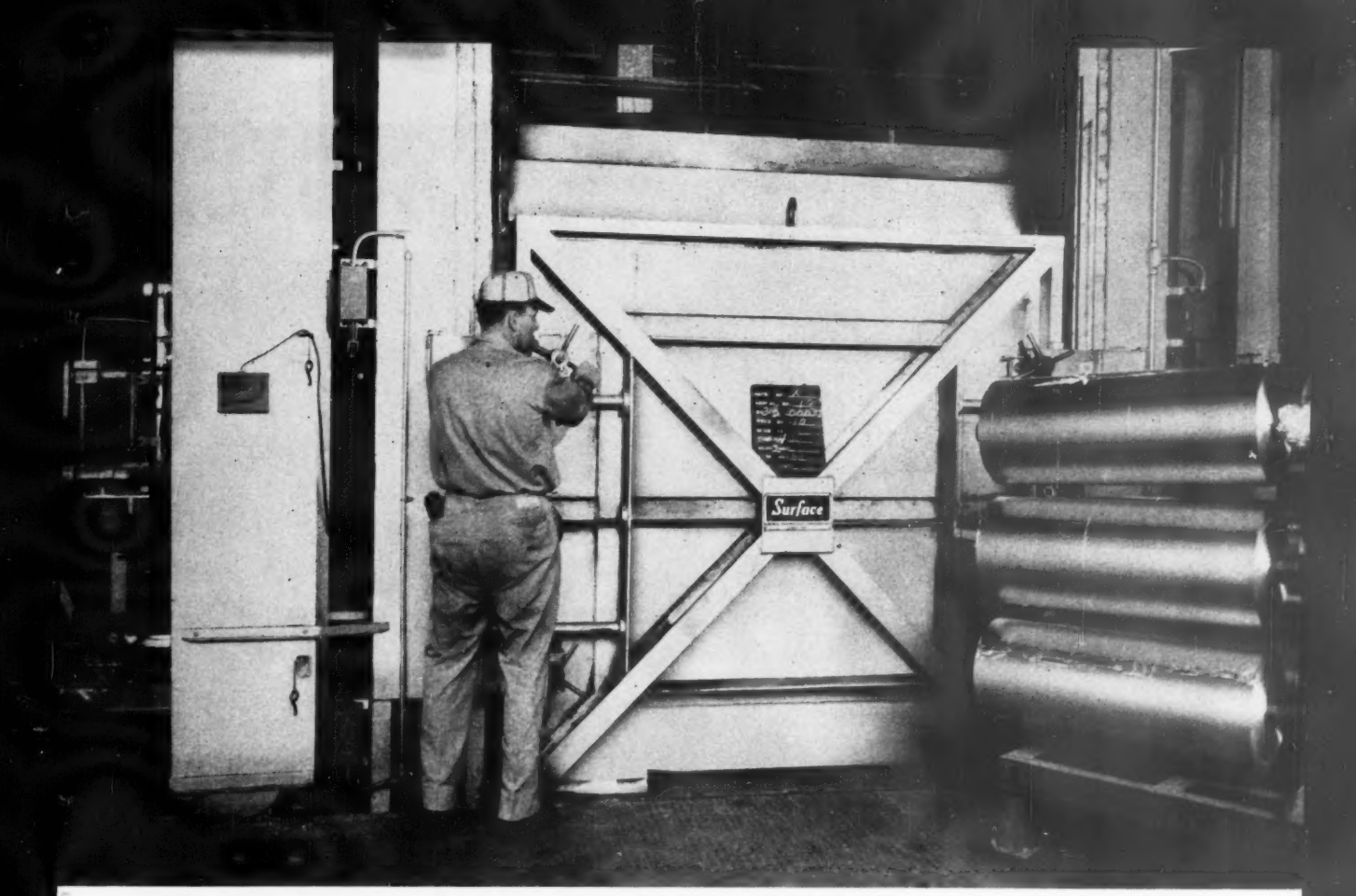

ANACONDA ALUMINUM ANNEALS FOIL WITH LOW-COST UNIFORMITY

in Surface Power Convection Furnaces

Phenomenal temperature uniformity (never varying more than 5°) and low costs are the profits earned by Anaconda Aluminum with four of these Surface Power Convection furnaces in their Louisville plant.

Each furnace anneals an 8,000-lb. load of coiled aluminum foil in a seven-hour heating cycle. Coils are stacked on racks, as you see here, and fork-lifted directly into the furnaces. Surface DX® generator gas protects the foil during the cycle.

Power Convection* equipment simplifies furnace construction,—just one fan, minimum furnace size for its capacity. This reduces both first cost and operating maintenance. For more data on Surface Power Convection equipment write for Bulletin SC-182. Surface Combustion, 2385 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ontario.

*Trademark of Surface Combustion, Division of Midland-Ross Corp.

Surface® *A division of Midland-Ross Corporation* MR

SCOTCH
BRAND

TAPEnology . . . industry's newest cost-cutting tool

GET PERFECT PAINT JOBS EVERY TIME WITH DIE-CUT MASKS OF TAPE

Cover and protect parts with die-cut masks of "SCOTCH" BRAND High-Heat Masking Tapes during spraying and baking cycles. These economical die-cut masks, shaped to pattern of part, save masking time, labor, and materials—give positive placement for faster, neater finished work.

"SCOTCH" High-Heat Masking Tape's excellent adhesive quality holds fast at bake temperatures up to 350°F—results in clean, sharp-line paint jobs every time—yet tape peels off easily when finished and leaves no residue.

Die-cut shapes of "SCOTCH" Masking Tapes are readily available through your local "SCOTCH" BRAND Tape printer-convertor.

What's your problem? With die-cut masks your 3M representative can help you solve not only painting problems but many others from machining to storage and shipment. Ask your nearest "SCOTCH" BRAND Tape Distributor or write: 3M Company, 900 Bush Ave., St. Paul 6, Minnesota, Dept. IAU-100.

When tape costs so little, why take less than "SCOTCH" Brand?

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.
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. . . WHERE RESEARCH IS THE KEY TO TOMORROW

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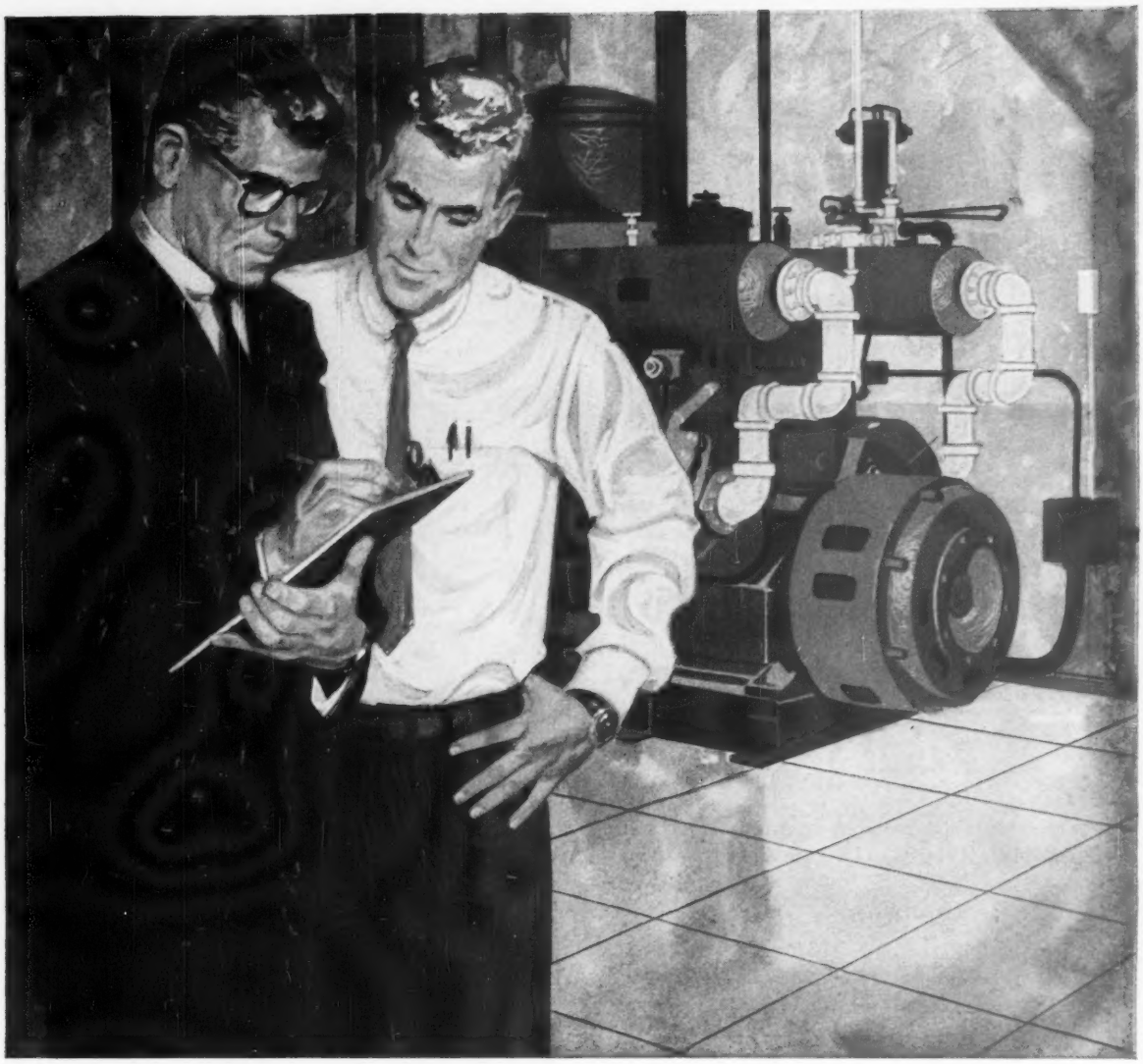

He makes air power earn more than its keep

This man knows how to put air to work. He's the Gardner-Denver Compressed Air Specialist, and every business day he helps plan air power for factory production lines. He consults with plant engineers, helps design new compressed air systems, or helps rejuvenate present air facilities.

After a Gardner-Denver compressed air system has been installed, he returns to these plants because it's his job to help methods engineers get full value from air power. He visits them time and again to see that every cubic foot of capacity earns its keep. And with his expert knowledge of the latest air power applications, he often helps cost committees with cost-saving tips.

If you've recently installed a Gardner-Denver air system, you'll be seeing this specialist soon. If you'd like to see him now, call your nearest Gardner-Denver branch.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

You don't have to see the "Red End" to know it's a

SIMONDS

HACKSAW BLADE

Just put it to work ... that's all!

Performance speaks for itself. And if you think there's no difference in hacksaw blades, try this:

TEST 1 BOX OF 10 SIMONDS "RED END" BLADES AGAINST ANY 10 OTHERS

Then you'll know you're getting more for your hacksaw dollar than you ever got before. And then you'll see why so many other hacksaw users "Say Simonds and Save!"

Simonds "Red End" Power Blades come in All-Hard and Shatterproof types in all standard lengths, thicknesses and tooth spacings . . . a "right" blade for every job! Three types of Hand Blades are also furnished in all standard specifications for best results at lowest cost.

Your nearby SIMONDS DISTRIBUTOR is your most dependable cutting tool supply source. His stocks and services are designed with your convenience and economy in mind. Call him FIRST for all your industrial supply needs!

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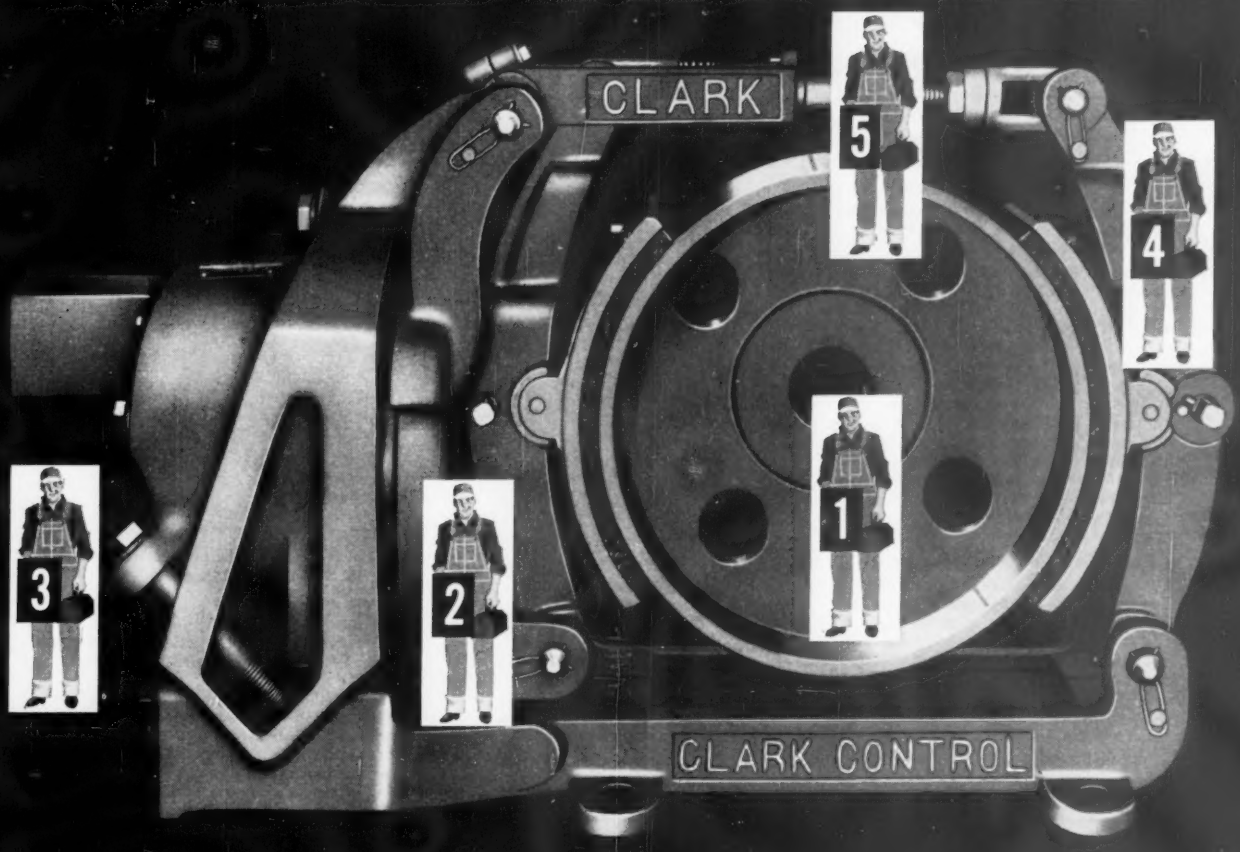
LOOKING FOR

SIMPLIFIED MAINTENANCE ?



Here's how Clark design helps

Any brake works properly when new. Clark brakes are easy to keep working that way.

It's the brake troubles that occur *after* thousands of operations that Clark engineers had in mind when they designed the AISE-NEMA D-C Magnetic Brake line.

Hundreds of successful applications attest to the design superiority that has made these brakes the choice of maintenance men wherever service conditions are most rugged.

Clark maintenance-reducing features include:

1 Powerful "nut-cracker" principle of operation, with shoe-arms hinged at top, assures equalized pressure on both shoes, improves lining life.

2 Top-hinging of magnet armature puts widest part of magnet air gap at bottom, so most of the dirt falls free—minimizing stoppages.

3 Magnet case and coil replaceable on the job without affecting brake adjustment or releasing brake. Self-contained, epoxy-potted coil is quickly and easily replaced in the case.

4 Interchangeable self-aligning shoes are readily replaceable and fit either side, either end up.

5 Maintenance adjustment is on *top* of brake for easy access.

PLUS many other Clark "maintenance-saver" features that greatly reduce downtime, speed maintenance, simplify adjustments and replacement of wearing parts.

For complete details on Clark D-C magnetic brakes, request a copy of Bulletin 106-B from your nearest Clark Controller sales office. Or write to : 60MB1

The
CLARK CONTROLLER
Company

Main Plant: *Cleveland 10* • **Western Plant:** *Los Angeles 58*
In Canada: *Canadian Controllers, Limited, Toronto*

Copper Alloy Bulletin

BRIDGEPORT BRASS COMPANY

new BRIDGEPORT NIRONZE® 635 gives 90,000 psi yield strength

90,000 psi Yield Strength Obtained with New Age-Hardenable Copper-Nickel-Silicon Alloy

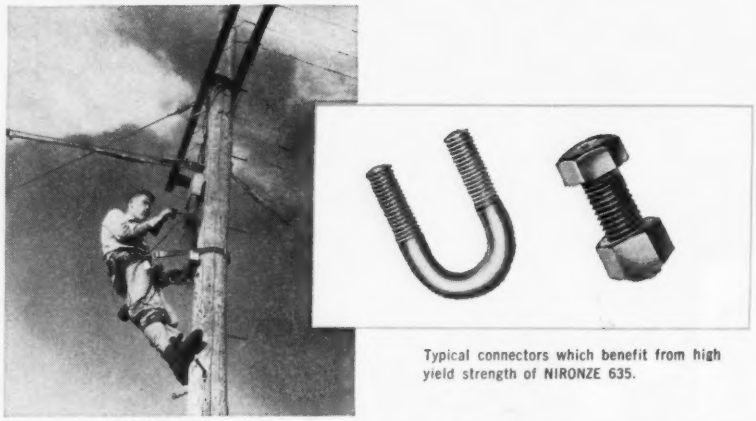
Bridgeport Nironze 635, an age-hardenable copper-nickel-silicon alloy, combines excellent cold-working properties with high tensile and very high yield strengths, good electrical conductivity, excellent general and stress-corrosion resistance. Supplied in the solution-treated and drawn condition, Nironze 635 offers exceptional cold-working properties. A low-temperature heat treatment, following additional cold-work age, hardens this alloy to produce tensile strengths of 100,000 psi, yield strengths of 85,000 psi and improved electrical conductivity of a minimum of 35% IACS.

Easily Cold-Formed . . . Machined

The excellent cold-working properties of Nironze 635 in the *solution-treated and drawn* condition allow such severe cold work as upsetting, cold-heading, roll-threading, bending, forming or similar operations to be carried out with ease. Heat treatment following this cold-work age-hardens this alloy to produce maximum tensile and yield strengths.

Nironze 635 in the *solution-treated-drawn-aged* condition has a machinability about 30% of free-cutting brass rod, thereby making it possible to carry out such conventional machining operations as sawing, grinding, turning, milling or similar operations.

Maximum cold-work may be performed on Nironze 635 in the *solution-treated* or soft condition. In order to obtain highest possible physical properties, this alloy must be cold-worked from 50-80% before aging.



Typical connectors which benefit from high yield strength of NIRONZE 635.

Proved by Performance in These Applications

Cold-headed bolts and fasteners used in pole line hardware, switch gear, wire connectors, neon signs, railway equipment, exposed electrical parts and structural supports, marine hardware and fittings can all use Nironze 635 to advantage. The new alloy's unique combination of high yield and tensile strengths, good conductivity and high corrosion resistance provides design and production advantages never before offered by a silicon bronze.

Test a Sample Now

Nironze 635 has been thoroughly evaluated in the laboratory and in the field to insure the high quality and top performance common to all Bridgeport alloys. To get your test samples and full technical information, call your nearest Bridgeport Sales Office. Or write us direct. Dept. 3911.

Nironze 635 is presently available as rod or wire, supplied in the solution-treated, solution-treated and drawn, and solution-treated, drawn and aged.

NIRONZE PHYSICAL PROPERTIES

Density	0.320 lb/in.³
Color	Red similar to copper
Thermal Expansion	8.9 x 10⁻⁶/°F
Melting Point	1990°F
Nominal Composition:	
Copper	97.5%
Nickel	1.9%
Silicon	0.6%
Total	100.0%
Electrical Conductivity, % IACS	
Cold-drawn and aged	30%
Cold-drawn	15%

MECHANICAL PROPERTIES (Nominal)

Form	Condition	Tensile Strength psi	Yield Strength psi	Elongation % (4D)	Contraction of Area %	Rockwell B Hardness	0/0 IACS
Rod and Wire	Solution-Treated	40,000	12,000	50	90	7	24
	Solution-Treated, Aged	88,000	70,000	12	20	86	43
	S.T. Drawn 50%	65,000	62,000	18	87	67	22
	S.T. Drawn 50%, Aged	100,000	90,000	12	25	95	42
	S.T. Drawn 80%	70,000	65,000	15	85	73	22
	S.T. Drawn 80%, Aged	103,000	97,000	17	62	96	39

COMPARATIVE RATINGS OF NIRONZE 635 vs STANDARD SILICON BRONZES

	Physical Properties: Electrical Conductivity (Annealed) % IACS	Physical Properties: Melting Point Liquidus °F	Physical Properties: Density lb/in.³	Fabrication Properties: Cold Workability	Fabrication Properties: Machinability Rating %	Fabrication Properties: Annealing Temp. °F	Mechanical Properties: Tensile Strength psi	Mechanical Properties: Yield Strength psi	Mechanical Properties: Rockwell B Hardness
NIRONZE 635	*35	1990	0.320	Excellent	*30	**850-900	100,000	85,000	95
High Silicon Bronze (A)	7	1880	0.308	Excellent	30	900-1300	108,000	60,000	95
Low Silicon Bronze (B)	9	1940	0.316	Excellent	30	900-1250	90,000	67,000	90

*The term "Nironze" is a registered trade-mark of the Bridgeport Brass Company

*Drawn and aged **Aging temperature

BRIDGEPORT BRASS COMPANY

Bridgeport 2, Connecticut • Sales Offices in Principal Cities

Specialists in Metals from Aluminum to Zirconium

EMPLOYEES

won't fall down on the job

...WHEN YOU INSTALL

Shur-Site Treads

Shur-Site treads are fabricated from rugged Mitco steel flooring, the pressure formed grating manufactured by Hendrick for 40 years! Assembled under hundreds of tons of hydraulic pressure, Shur-Site treads are joined by an internal cold rivet at the juncture of each transverse and cross bar. This affords double strength in the areas subject to major stress.

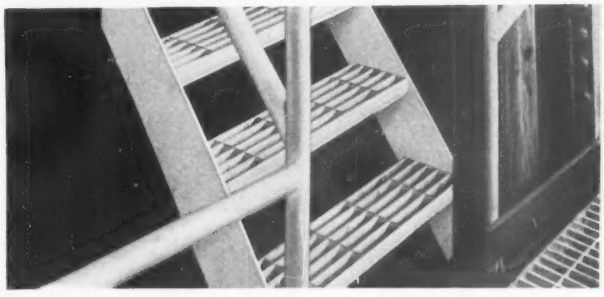
And Hendrick treads are non-clogging! There are no bolts, welds or external rivets to collect dirt and refuse. A deep nosing bar bent back under the front edge of the tread makes the step edge highly visible to minimize accidents. 90% open area doesn't restrict light or air. Shur-Site treads are available in standard sizes or in special widths and lengths, shipped ready to bolt directly to stair stringers.

HENDRICK

MANUFACTURING COMPANY

CARBONDALE, PENNA.

Perforated Metal • Perforated Metal Screens • Wedge Slot Screens • Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel Flooring – Shur-Site Treads – Armorgrids • Hydro Dehazers • Distillation Column Internals.



Hendrick Mitco is available in steel, stainless steel, aluminum and lightweight magnesium. For details, mail coupon, today!

HENDRICK Manufacturing Company

30 Dundaff Street, Carbondale, Penna.

Gentlemen: I would like more information about Hendrick Shur-Site Treads.

☐ Please have representative call.

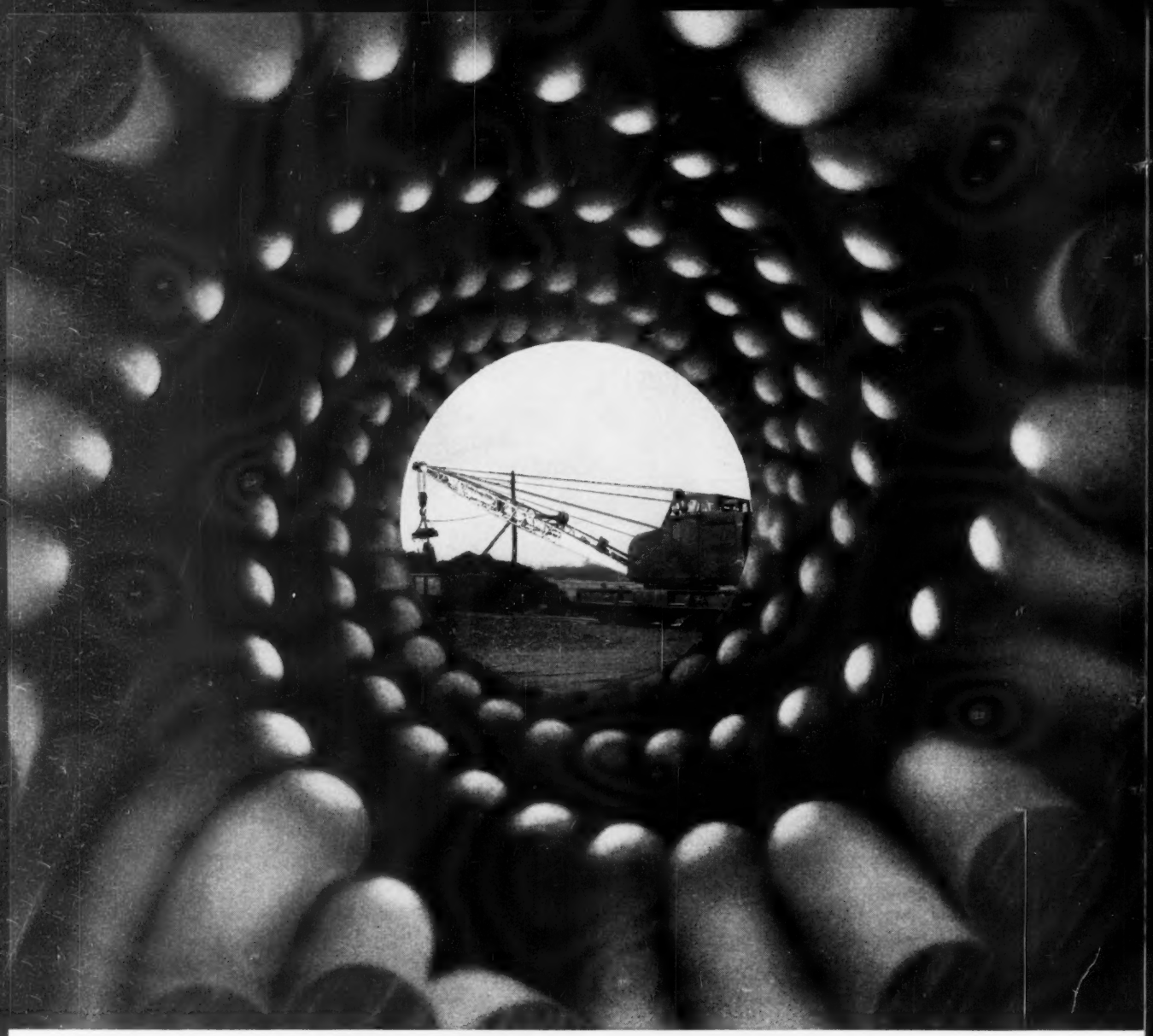
☐ Please send me FREE Booklet.

NAME_____ TITLE_____

COMPANY_____

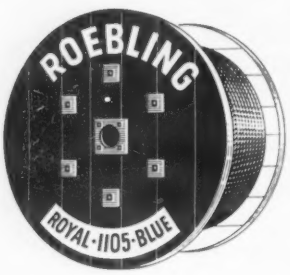
ADDRESS_____

CITY_____ STATE_____



ROEBLING ROYAL BLUE WIRE ROPE

WE PUT A LOT OF WORK INTO IT—YOU GET A LOT OF WORK OUT OF IT



This happens to be the inside view of Roebling Royal Blue — its core has been removed to show the uniformity and symmetry of the rope structure. You see how concerned we are with internal security.

We have to be. To make sure that Royal Blue will live up to the day-to-day demands made upon it. High stresses and unavoidable overloads, abrasion, fatigue, impact, crushing, sheave pressures and abusive drum-winding, to name the major ones.

Royal Blue goes through many inspections and tests—both internal and external —before reporting to work. This way we're sure that the rope we build will do what we sell it to do. These quality-control measures are your assurance that Royal Blue is made to save you money — anyway you look at it.

For details about hard-working Royal Blue, ask your wire rope distributor or write Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROEBLING

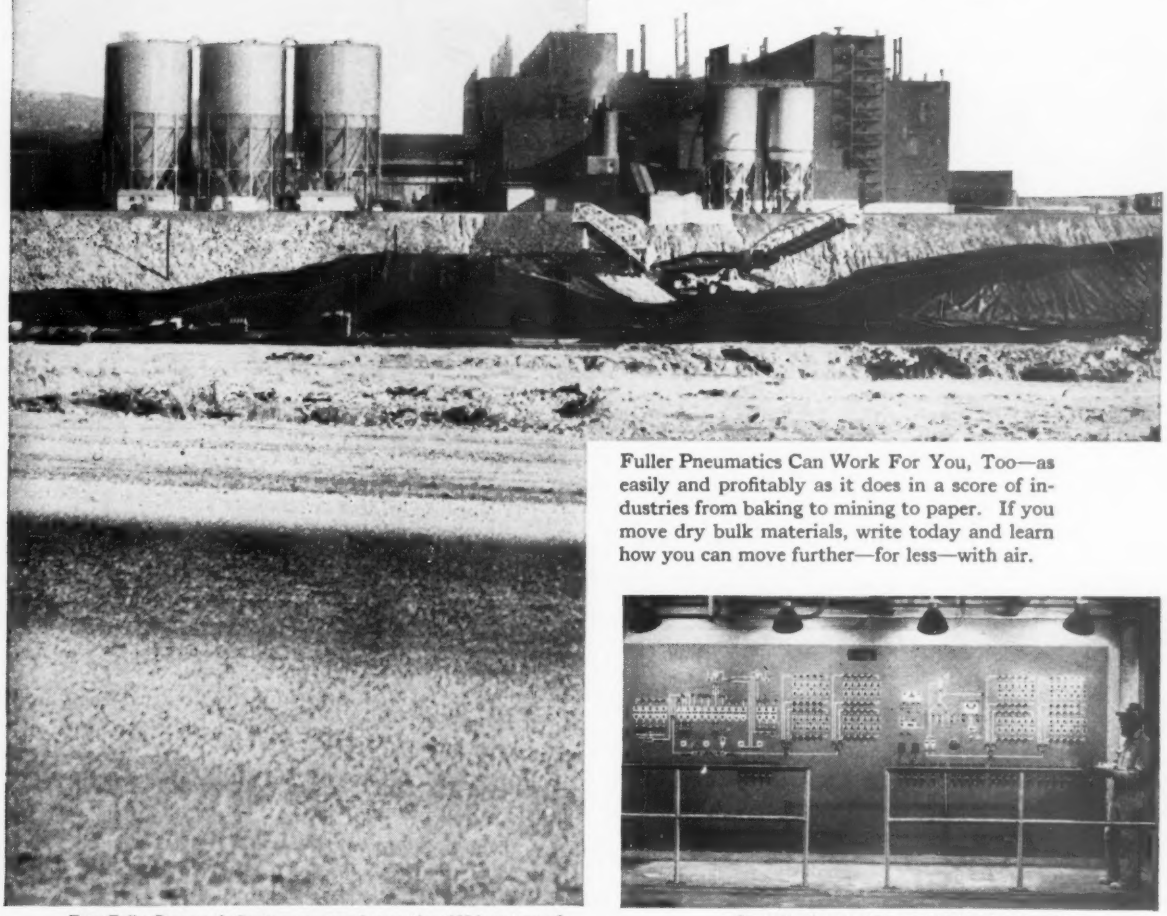
Branch Offices in Principal Cities • John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

How Pneumatic Conveying Helps Make New Mining Process Economically Practical

Taconite processing is typical of the many varied, cost-saving applications for Fuller Pneumatic Conveying.

They're turning low assay iron ore into rich pellets on the Mesabi these days. Moving additives for pelletizing, Fuller plays a special role in this feat of engineering and production economy.

Fuller Pneumatic Conveying Systems are carrying fine anthracite screenings, soda ash, and bentonite from siding to storage to processing—with speed, safety, sanitation, and efficiency. With few moving parts to wear out and powered by inexpensive low-pressure air, Fuller Pneumatic Conveying Systems speed dry bulk materials *anywhere that a pipeline can be run:* under ground, up through floors, around corners . . . for far greater distances and at substantially lower cost than possible with mechanical conveyors.



Four Fuller Pneumatic Systems can speed more than 307 long *tons* of additives through this huge Taconite Pelletizing Plant in a single day.

Fuller Pneumatics Can Work For You, Too—as easily and profitably as it does in a score of industries from baking to mining to paper. If you move dry bulk materials, write today and learn how you can move further—for less—with air.

Centralized control is provided by giant panel designed and manufactured by Fuller.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
160 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

2097
G229

Morgan Crane selected for wide mill expansion program

This Morgan stripping crane was recently installed at Alan Wood Steel Co. in Conshohocken, Pennsylvania, in connection with their wide mill expansion program. Advanced features such as auxiliary hoist, stool breaker, 400-ton stripping capacity and traditional Morgan efficiency have been included in this universal type ingot stripping crane.

For large tough jobs where efficiency and dependability are a *must*, Morgan cranes pay off time after time. This is one of the reasons Morgan Engineering gets so many repeat orders from its customers.

If cranes are included in your expansion or modernization plans, be sure to get in touch with the Morgan people.

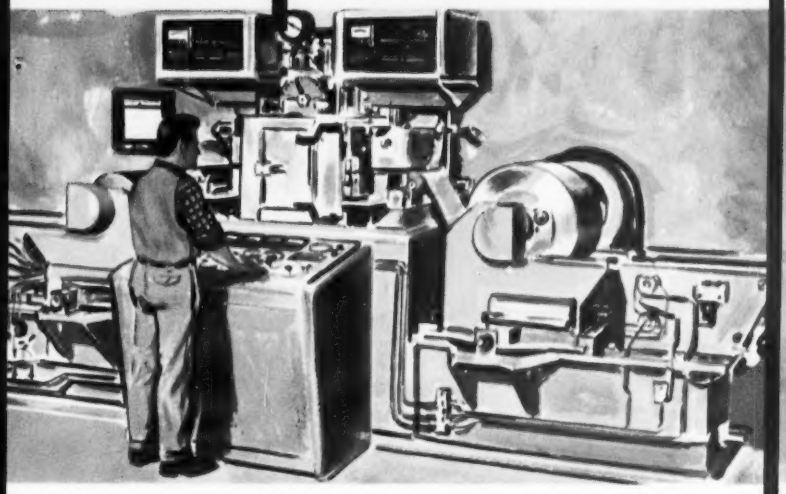
THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

Overhead electric traveling cranes, gantry cranes,
open hearth special cranes, blooming mills, structural mills,
shears, saws, auxiliary equipment and welded fabrications.

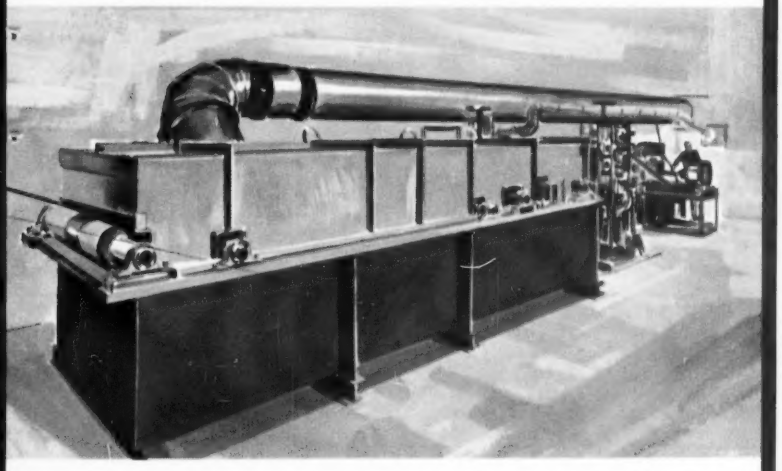
Specialized Facilities for

STAINLESS STEEL

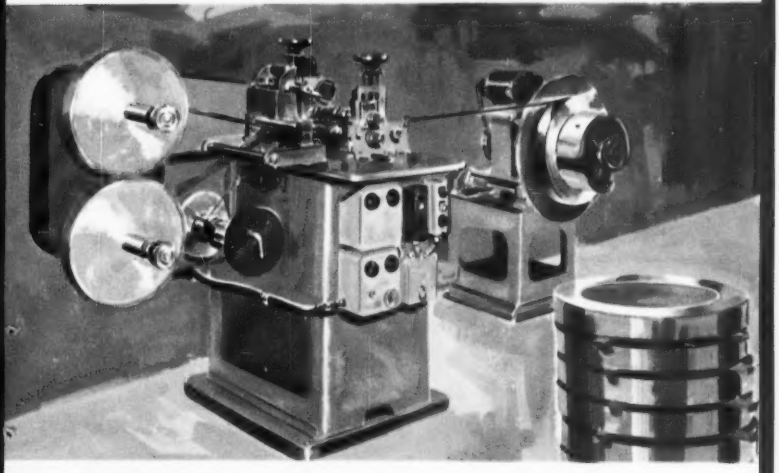
Custom and Conversion Rolling



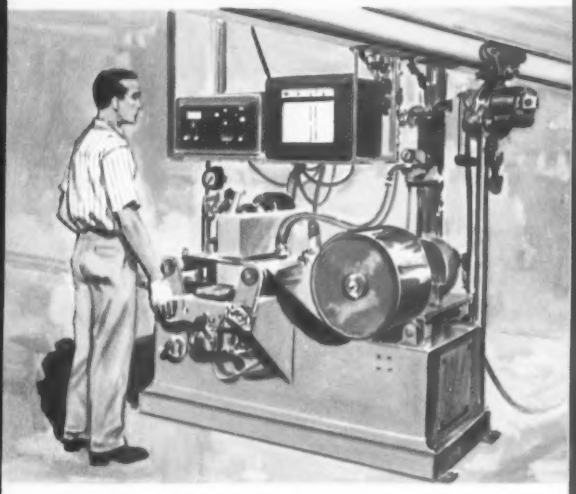
12½" SENDZIMIR MILL • Our 12½ inch "Z" mill rolls all metals to thicknesses as thin as .0003".



ACID CLEANING • The first continuous acid cleaning and pickling line of its kind in the country.



SLITTING • Precision slitting entirely separate from our facilities for standard production.



INSPECTION • Inspection, both visual and beta gauge, with continuous recording guarantees close tolerance satisfaction.

Reliable Rodney says:

"The first super-thin, extra wide (24") precision rolling of the following alloys was done right here at Rodney: high nickel, uranium, titanium, stainless, columbium. A combination of specialized equipment unequalled in the industry makes Rodney a tailor-made plant for conversion. We have these additional new facilities to give you the finest quality and service in processing super-thin, stainless steel and special alloys. Let us convert your metals and alloys to the exact specifications you require."

RODNEY ROLLED IS
QUALITY CONTROLLED

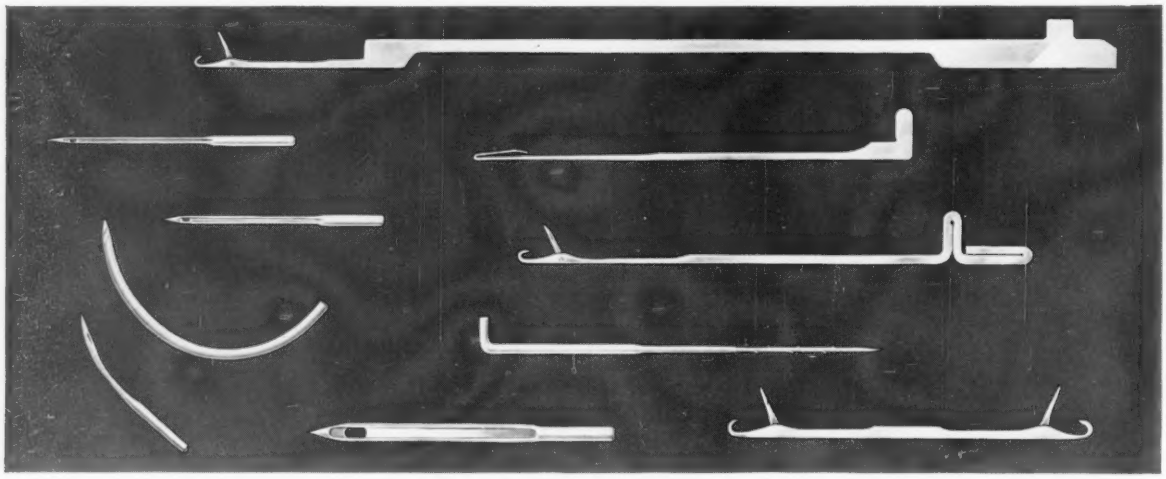
Write for illustrated brochure describing our complete facilities.

RODNEY METALS, INC.

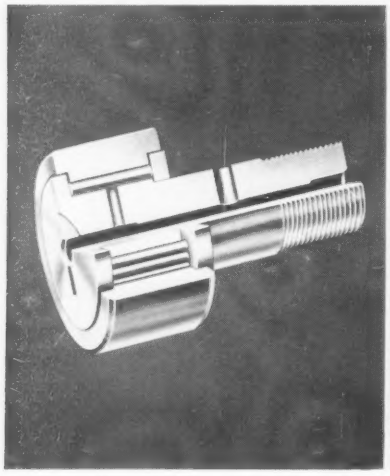
(MILL) NEW BEDFORD, MASS.

West Coast Office and Warehouse:
5462 East Jillson St., Los Angeles 22, Cal.

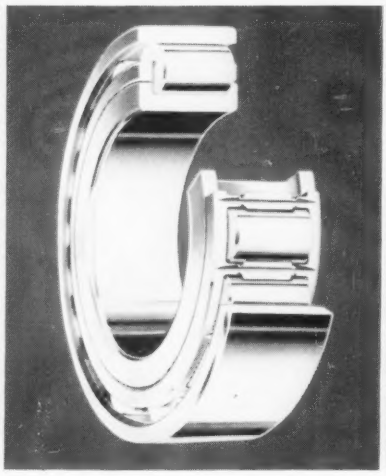
YES, TORRINGTON MEETS EVERY NEED FOR MACHINE NEEDLES: KNITTING, SEWING, TUFTING, FELTING...



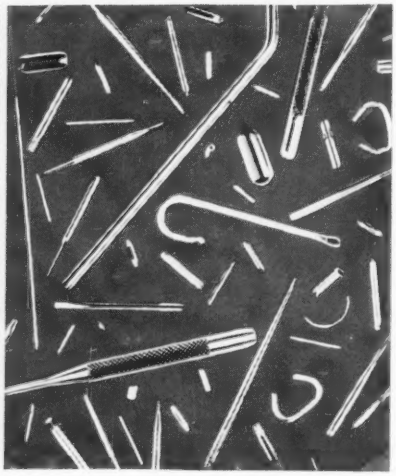
BUT THIS, TOO, IS TORRINGTON...



Outstanding maker of needle roller cam followers built to withstand heavy loads in aircraft, textile machinery and other equipment.



Precision manufacturer of radial roller bearings used for such heavy duty applications as steel rolling mill and oil field equipment.



Foremost producer of small precision metal parts, manufactured by the millions for use in countless industrial and consumer products.

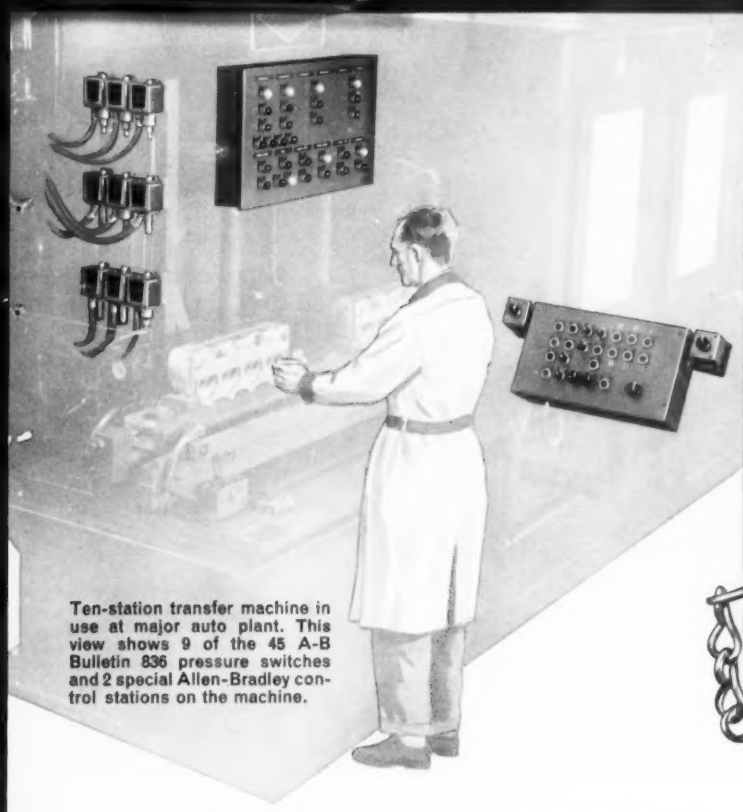
In these and many other fields throughout the world Torrington is contributing to

PROGRESS THROUGH PRECISION

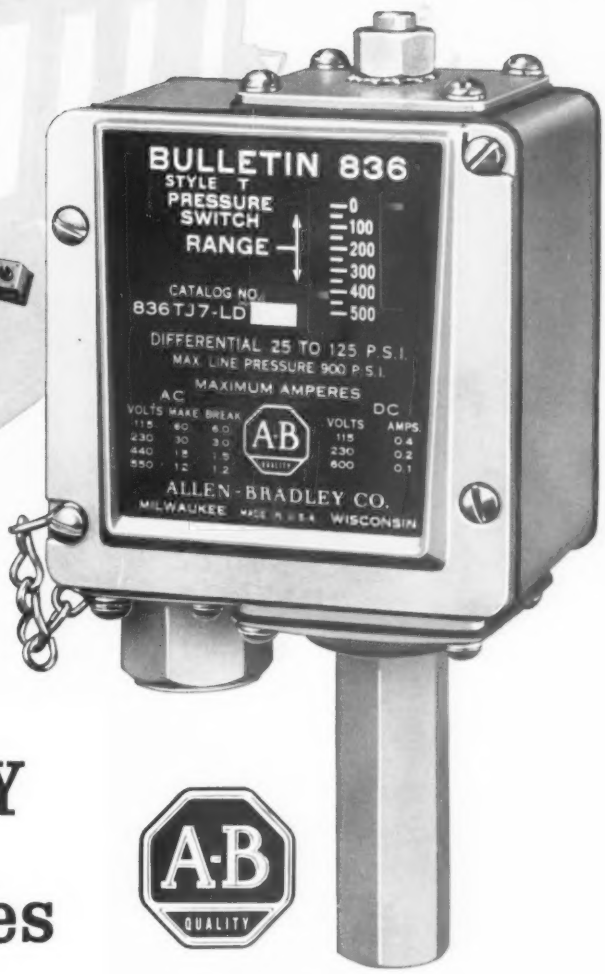
THE TORRINGTON COMPANY

Torrington, Connecticut

Serving industry from plants located in the United States, Canada, England, Germany and Italy



Ten-station transfer machine in use at major auto plant. This view shows 9 of the 45 A-B Bulletin 836 pressure switches and 2 special Allen-Bradley control stations on the machine.



ALLEN-BRADLEY

OILTIGHT

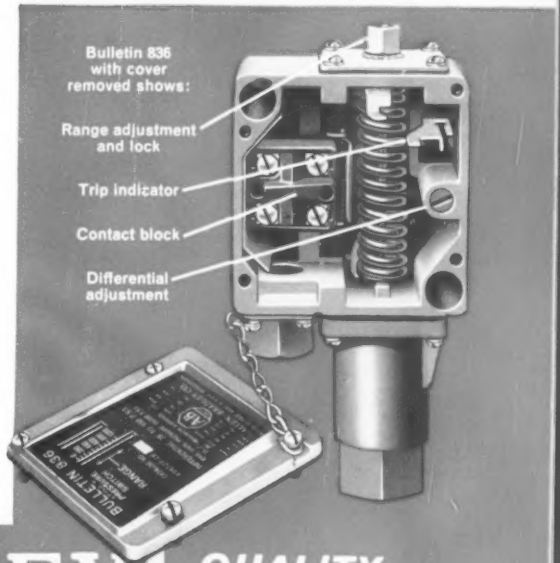
Pressure Switches

provide consistent accuracy and maximum reliability

Bulletin 836 Style T
Oiltight Pressure Switch

These rugged Allen-Bradley Bulletin 836 Style T oiltight pressure switches are specifically designed to take the punishment of hard, day-in and day-out industrial use. The die-cast aluminum housing is completely sealed. Oil cannot get in and foul the contacts—even when it flows over the enclosure in a continuous stream. The precision switch mechanism insures extreme accuracy of repeatability. An extremely important feature lies in the "snap action" of this switch—it maintains its normal contact pressure up to the instant of switchover—regardless of how slowly the trip point is approached. Contact chatter—which means unreliable operation—is impossible, and contact life is greatly increased. The contact block has two isolated circuits with one N.O. and one N.C. set of contacts.

Both the operating pressure and the differential are adjustable. The pressure is externally adjustable with the setting shown on a calibrated scale, and a trip indicator shows the operating point. These A-B *quality* controls are made for operating at pressures up to 5000 psi. Write for full details.

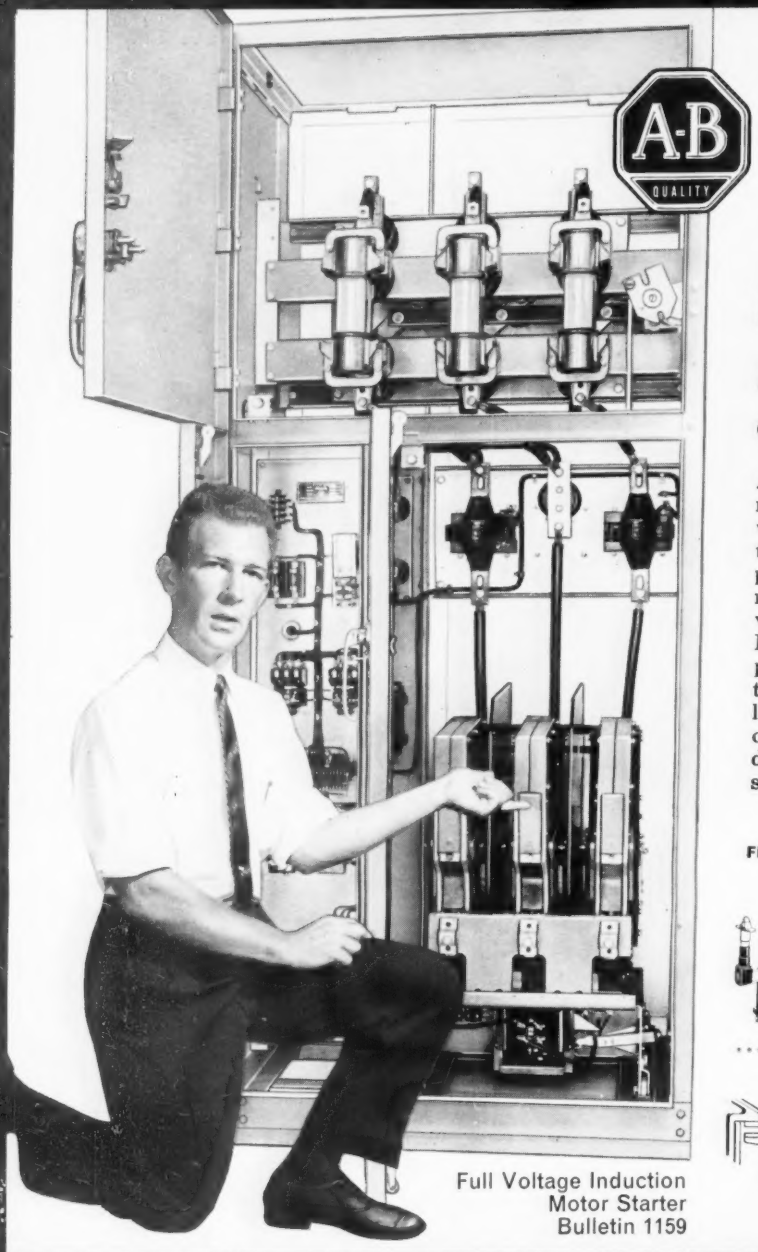


ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1318 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ontario



Full Voltage Induction
Motor Starter
Bulletin 1159

The only
HIGH VOLTAGE STARTERS

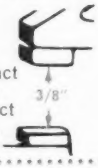
built to provide millions of trouble free operations

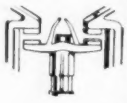
An astounding claim but true! The secret of this remarkable operating life of Allen-Bradley high voltage air break starters is found in the extremely short contact travel—*it's only ⅜".* Thus, pounding and contact wear are reduced to a minimum. In addition, contactors in A-B high voltage starters have only ONE moving part. It's the same simple solenoid design that has proved good for millions of trouble free operations in A-B low voltage starters. And like A-B low voltage starters, the double break, silver alloy contacts never need maintenance. For complete details on Allen-Bradley high voltage starters, send for Publication 6080.

FEATURES OF THE ALLEN-BRADLEY RUGGED SOLENOID AIR BREAK CONTACTOR

ONE MOVING PART
All trouble-causing pivots, pins, and flexible jumpers are eliminated.

CONTACT TRAVEL ONLY 3/8"
Reduced impact and pounding extends contact operating life.

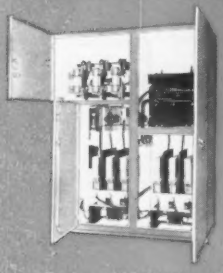




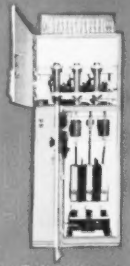
DOUBLE BREAK CONTACTS
of silver alloy completely eliminate the need for contact maintenance.

FAST ARC SUPPRESSION
New blowout design, new arc chutes molded of arc resistant material.

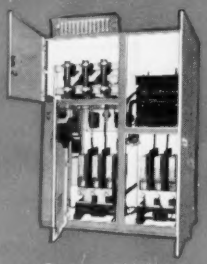
ALLEN-BRADLEY HIGH VOLTAGE STARTERS ARE MADE FOR ALL TYPES OF MOTORS AND ALL TYPES OF SERVICE



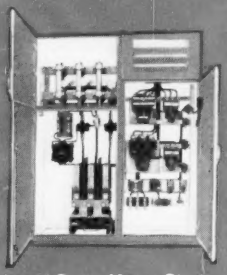
Reduced Voltage
Induction Motor Starter
Bulletin 1172



Full Voltage
Synchronous Motor Starter
Bulletin 966



Reduced Voltage
Synchronous Motor Starter
Bulletin 983



Wound Rotor Motor Starter
Bulletin 1180

ALLEN-BRADLEY

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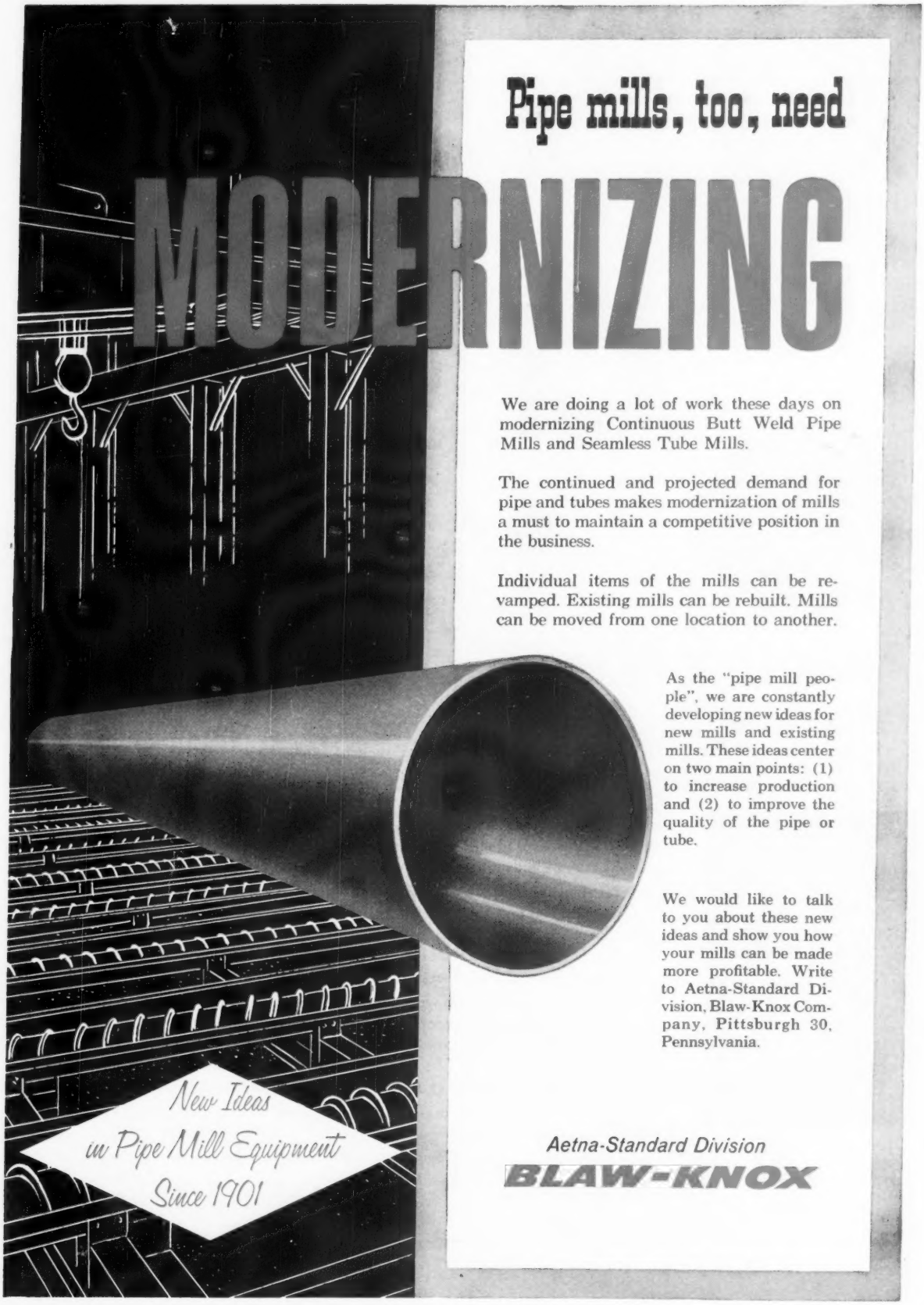
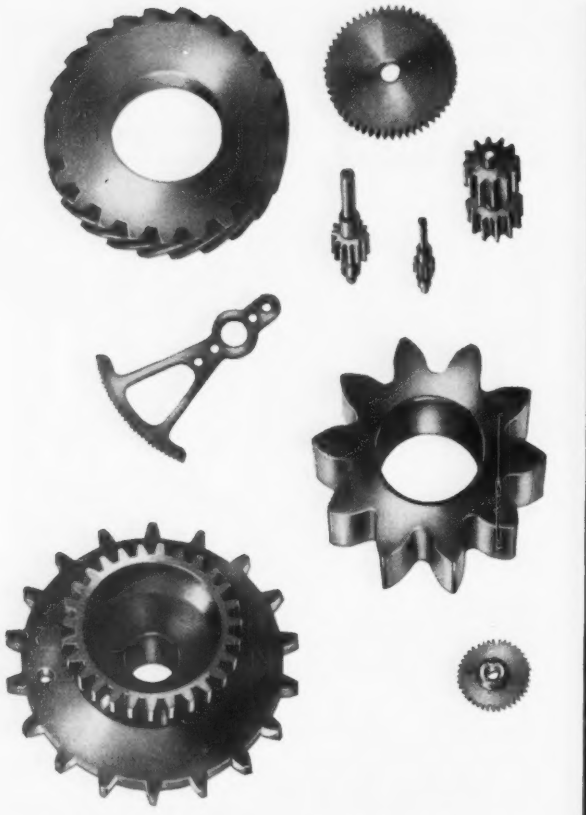
QUALITY MOTOR CONTROL

12-60-MP

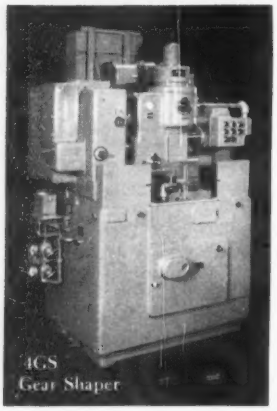

Pipe mills, too, need
MODERNIZING
We are doing a lot of work these days on modernizing Continuous Butt Weld Pipe Mills and Seamless Tube Mills.
The continued and projected demand for pipe and tubes makes modernization of mills a must to maintain a competitive position in the business.
Individual items of the mills can be revamped. Existing mills can be rebuilt. Mills can be moved from one location to another.
As the "pipe mill people", we are constantly developing new ideas for new mills and existing mills. These ideas center on two main points: (1) to increase production and (2) to improve the quality of the pipe or tube.
We would like to talk to you about these new ideas and show you how your mills can be made more profitable. Write to Aetna-Standard Division, Blaw-Knox Company, Pittsburgh 30, Pennsylvania.
New Ideas in Pipe Mill Equipment Since 1901
Aetna-Standard Division
BLAW-KNOX



INVOLUTE GEARS

NON-INVOLUTE PARTS

FELLOWS GEAR SHAPERS DO DOUBLE DUTY



4GS
Gear Shaper

Fellows Gear Shapers are not limited to the production of gears alone. They are valuable production machines ideal for the manufacture of many types of parts, of both involute and non-involute form.

As gear shapers, they provide high production rates in the manufacture of internal and external spur and helical gears. As general purpose production machines, they also make possible the economical production of irregularly shaped parts . . . in many cases doing in one simple operation what would require several operations using conventional shop tools.

Your Fellows representative will gladly give you the facts on how the complete Fellows line of production and inspection equipment helps increase production and cut costs. Ask him, or write direct.

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U.S.A.

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N.J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

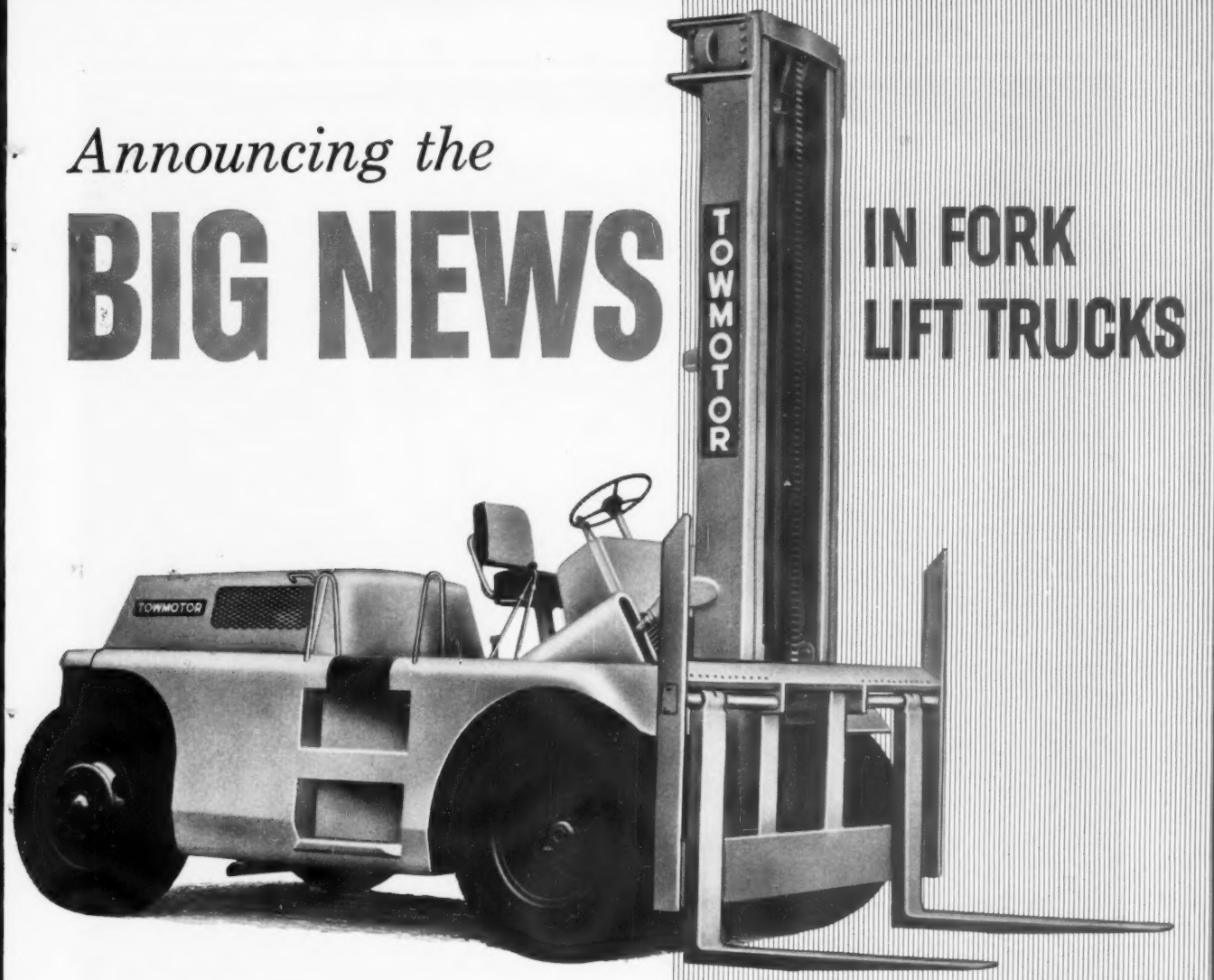
THE PRECISION LINE

Fellows

Gear Production Equipment

Announcing the

BIG NEWS IN FORK LIFT TRUCKS



If you unload, move, stack and load heavy materials be sure to get information on the new big-capacity Towmotor "Monarch" Series Fork Lift Trucks. They're as new . . . all-new . . . as they look!

All eight of the new "Monarch" Series models are built to handle your roughest and toughest jobs . . . yet they are easy to handle . . . and feature—

- New High-Traction "Low Profile" Styling
- New Extra-Visibility Mast Design
- New Equalized Weight Distribution
- New "Unitized" Frame and Body Construction
- New Up-Dated Easy-Operation Features

They all include many more engineering "firsts" described in new Towmotor "Monarch" Series bulletins covering models with 5 to 12 ton load capacities. For specifications, write Gerlinger Carrier Co., Dallas, Oregon.

TOWMOTOR

"MONARCH"

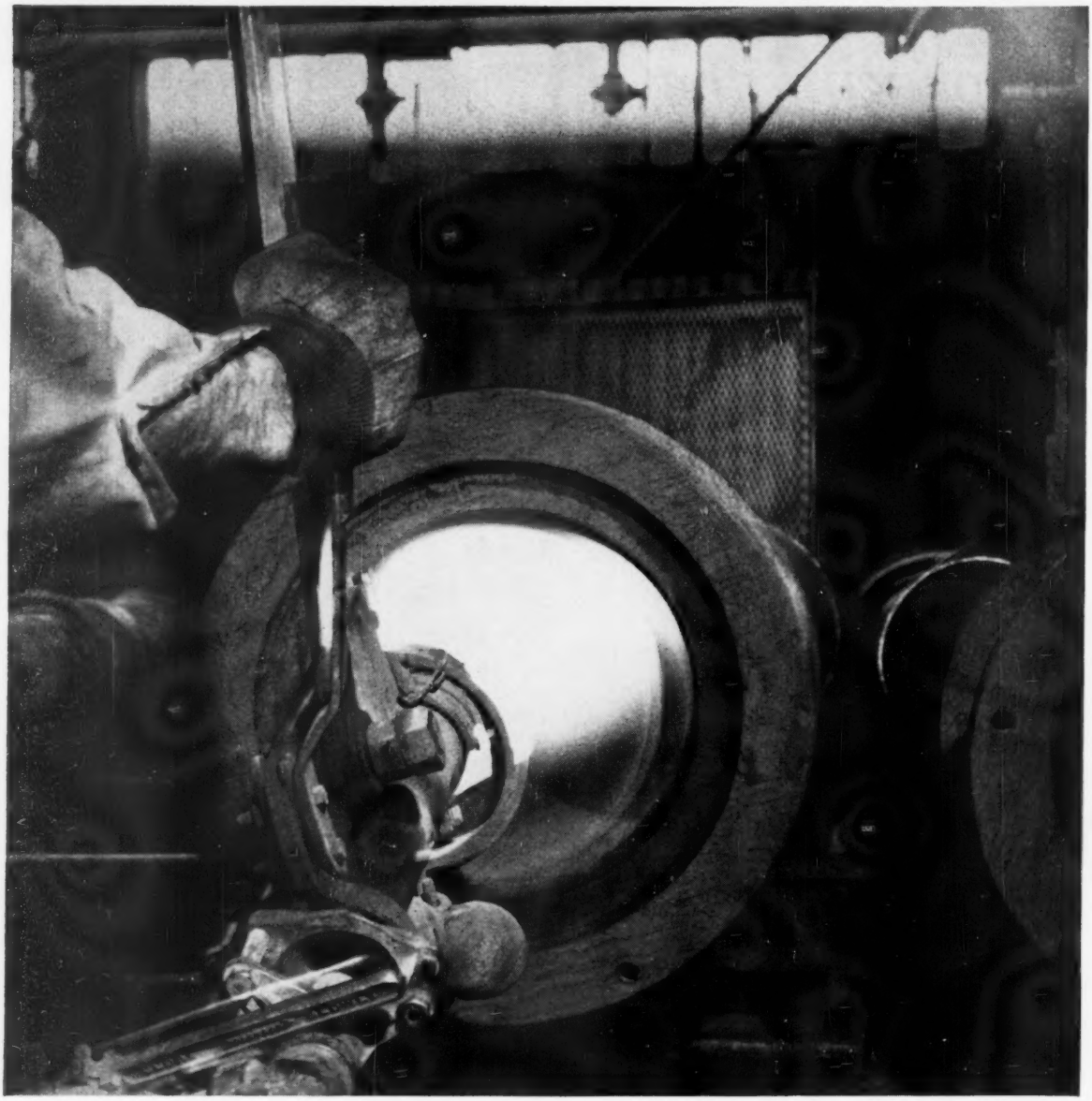
AN ALL-NEW SERIES OF HEAVY DUTY FORK LIFT TRUCKS BY

TOWMOTOR THE ONE-MAN GANG® -GERLINGER

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co., Dallas, Oregon, is a subsidiary of Towmotor Corporation

Intense heat from four Gas-fired torches skin dries pipe molds in as little as 2 minutes, after ramming and facing with a blacking material.



Only GAS provides the clean, uniform heat needed to skin dry pipe molds! Millions of BTU's of clean, uniform heat are required every hour by Warren Foundry & Pipe Division of Shahmoon Industries, Inc., Everett, Massachusetts, to skin dry its pipe molds.

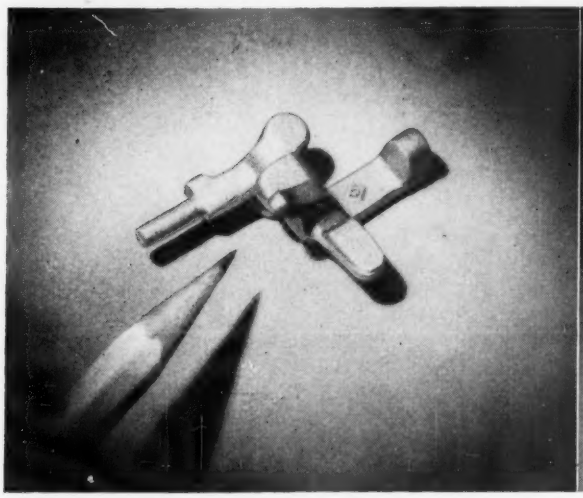
Only Gas provides this volume of heat without any problems of shipping and storage. That's why Warren Foundry chose Gas to solve this large scale heating problem. And as plant engineer William Mitchell says, "We chose Gas over other fuels because of its cleanliness and uniformity of heat value."

For information on how Gas can help you with your production problems, call your Gas Company's Industrial Sales Engineer. He'll be glad to discuss with you the economies and outstanding results you get with the clean, uniform heat of Gas, and modern Gas-fired industrial equipment. AMERICAN GAS ASSOCIATION

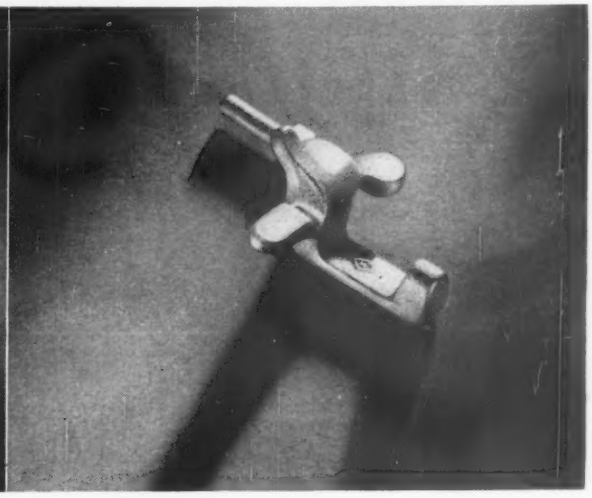
FOR CONTROLLED INDUSTRIAL HEATING

. . . GAS IS GOOD BUSINESS!

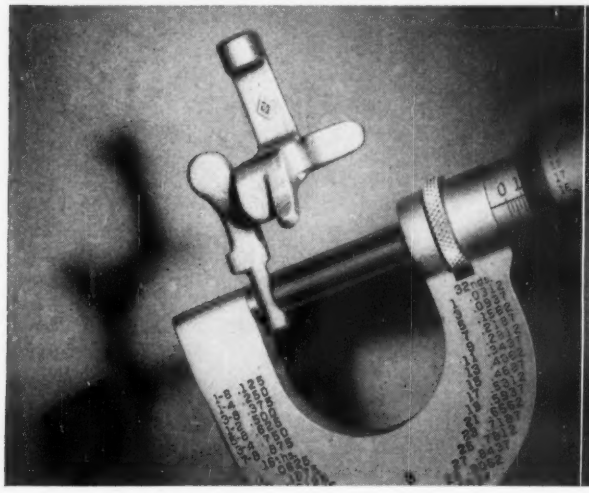
THIS INTRICATE FORGED PART WILL GIVE YOU NEW IDEAS . . .



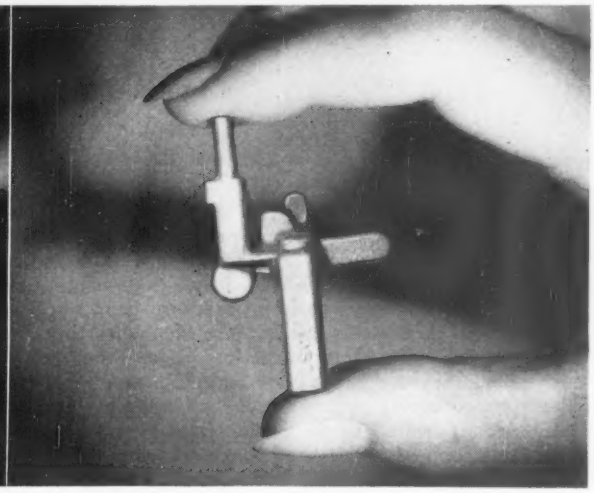
ON STRENGTH Insurance against equipment failure was the primary specification for this steel part for an electronic key punch machine. A Williams forging was selected to give the required strength and toughness for greatest dependability during high speed operations.



ON SHAPE The complicated contours of this part require controlled grain flow in many directions to provide maximum strength at points of greatest stress. Here the desired result was achieved by a parting line that is a complex intersection of 5 planes and 2 curved surfaces.



ON SIZE No part is too small for Williams. This part weighs only ½ ounce, yet Williams forging designers give the same attention to quality and cost of manufacture within close tolerances as they do to large forgings weighing up to 250 lbs.



ON FORGEABILITY Besides greater freedom of design, Williams forgings often result in fewer finishing operations, lower unit cost at point of assembly and dependability for years of heavy duty, in-service use. Let us help you determine the *forgeability* of your next part.

WILLIAMS PRECISION FORGINGS

FROM CARBON, ALLOY AND STAINLESS STEEL, MONEL, BRASS, BRONZE, COPPER, ALUMINUM ALLOYS AND TITANIUM.

J. H. WILLIAMS & CO.
DIVISION OF UNITED-GREENFIELD CORPORATION
406 VULCAN STREET • BUFFALO 7, N. Y.

Please send your new Forging Design Manual No. 60 which includes all necessary design data—tolerance tables, standard practices, specifications, etc.

NAME_____ TITLE_____

FIRM _____

STREET _____

CITY_____ ZONE____ STATE_____

Fully Automatic
FORGING MACHINE
DELIVERS 45 PIECES PER MINUTE!

The illustration above shows a 2" HILL ACME Automatic Forging Machine with an induction heater producing 5/8" and 3/4" mine roof bolts, in lengths from 12" to 72", at the rate of 45 pieces per minute in sustained operation. Bars are loaded into the feeding rack where an index feed, chain driven, positions them for proper spacing through the induction furnace. As the bar ends are heated they are delivered, at the proper timing cycle, to the forging machine by a roller chain feed where they are gauged for length, picked up by fingers and passed progressively through the dies. Finished forgings are discharged from the back of the machine by means of a separately driven conveyor, arranged for both right and left hand discharge.

The design of this new HILL ACME AUTOMATIC forging unit does not limit the number of passes or the length of stock to be used in forging a variety of parts. Pieces longer than 36" are supported by a walking beam through the various passes.

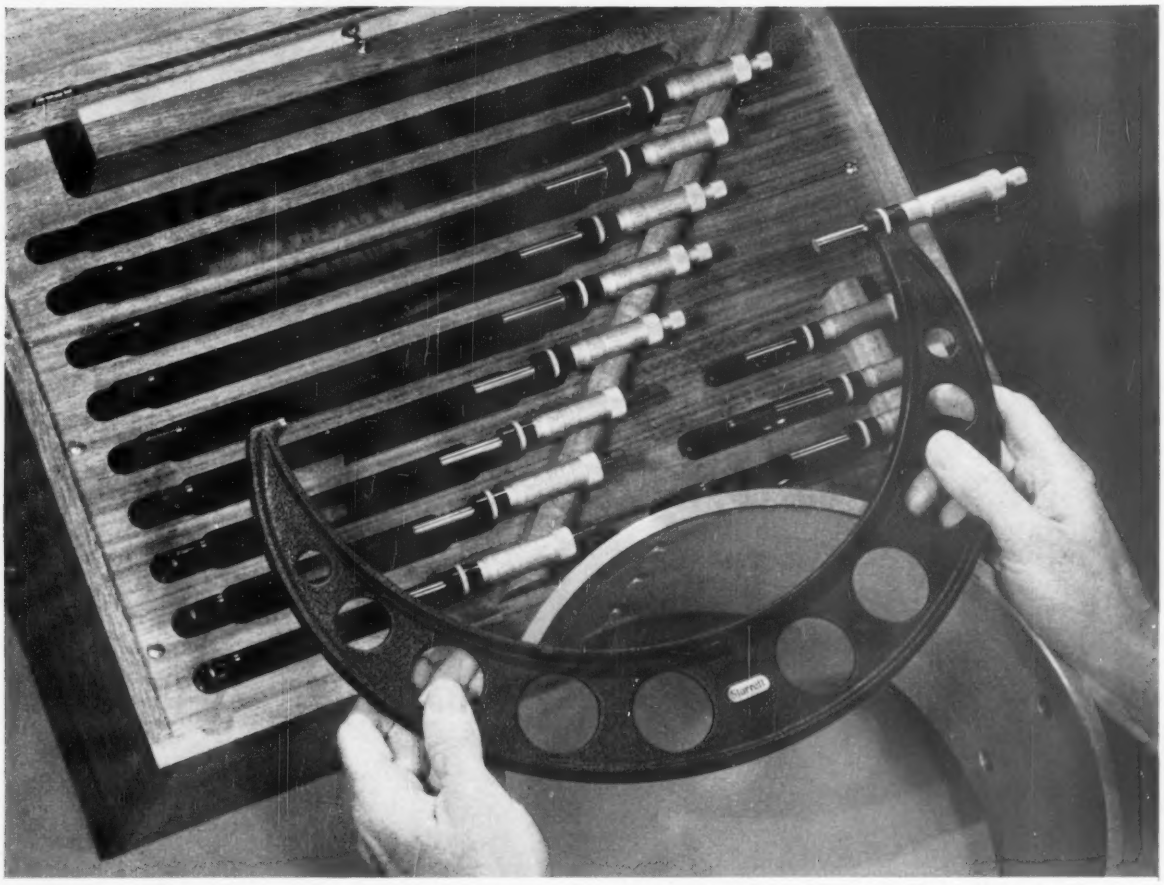
HILL ACME AUTOMATIC forging machines are built in 1¼" to 5" capacities all of which can be automated. Your inquiry concerning high speed automatic forging equipment will receive prompt attention.

The HILL ACME Company

1207 W. 65th STREET • CLEVELAND 2, OHIO

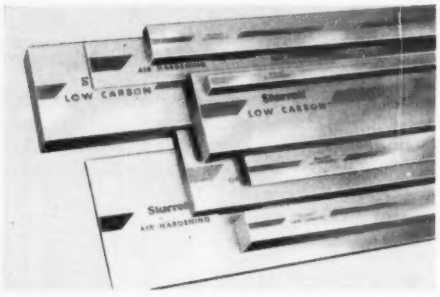
Manufacturers of: "ACME" FORGING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • ROTARY SHEARS • BAR-BILLET SHEARS • "HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "CLEVELAND" KNIVES • SHEAR BLADES • MATERIAL HANDLING EQUIPMENT

We now manufacture, distribute and service the entire line of KLING metal working tools.



PRECISION MEASURING TOOLS — Micrometer Caliper Set No. S436E-RL, 0-12" Range illustrated above

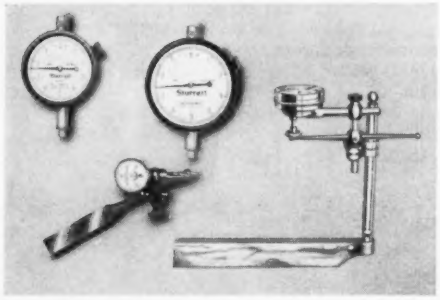
Starrett® for measuring ease no other tools can match



Only Starrett offers the complete range of sizes and types that lets you choose the right tool for any measuring job. No other make can match Starrett perfection of design with every feature precisely right for better, faster precision measuring.

Your nearby Industrial Supply Distributor stocks a complete line of Starrett products all made to the same high standards of quality. Write for complete catalog No. 27. Address Dept. 3, The L. S. Starrett Company, Athol, Massachusetts, U. S. A. . . .

World's Greatest Toolmakers



PRECISION GROUND DIE AND FLAT STOCK
DIAL INDICATORS AND GAGES
HACKSAWS, HOLE SAWS, BAND SAWS, BAND KNIVES

"ALCOA ALUMINUM SCREW MACHINE STOCK ALLOY 2011 CUTS YOUR UNIT COST!"

Precision-made, high-volume screw machine parts cost less in aluminum

Final cost of your machined component . . . material cost plus production cost . . . is *lower* with Alcoa Alloy 2011-T3. That's because this faster machining alloy cuts production time . . . machines easier . . . can be held to close tolerances . . . gives a bright, clean finish. And Alcoa® Aluminum 2011-T3 gives you three times as many parts per pound as other, heavier metals, for still more savings. By using Alcoa Aluminum 2011-T3 Screw Machine Stock you get all the inherent advantages of automatic screw machine products.

Be sure to ask your Alcoa distributor or Alcoa sales office for your free *Alcoa Conversion Calculator*. It makes cost conversions from brass to aluminum quick, easy, finger-tip operations. Also get your free *Alcoa Screw Machine Stock Estimating and Operating Data Book*, the most comprehensive book of its kind in the screw machine field . . . packed with easy-to-find technical data.

You'll want information, too, on other Alcoa screw machine alloys: 2017-T4 or -T451 for strength at low cost, 2024-T4 or -T351 for strength with high production, and 6061-T6 or -T651 for superior finishes, excellent joining characteristics and extra corrosion resistance. Aluminum Company of America, 845-X Alcoa Building, Pittsburgh 19, Pennsylvania.

ADDITIONAL BONUSES YOU GET WITH EVERY ALCOA ALLOY:

1. Wide range of stock sizes for important price advantages.
2. Guaranteed market for up to 60 per cent of your Alcoa Aluminum turnings and borings.
3. Extensive mill and distributor inventories to meet all requirements.
4. Chamfered ends at no extra cost.
5. Specific 12-ft lengths at no extra cost (for rounds up to 2¾ in.; hexagons up to 2 in.).

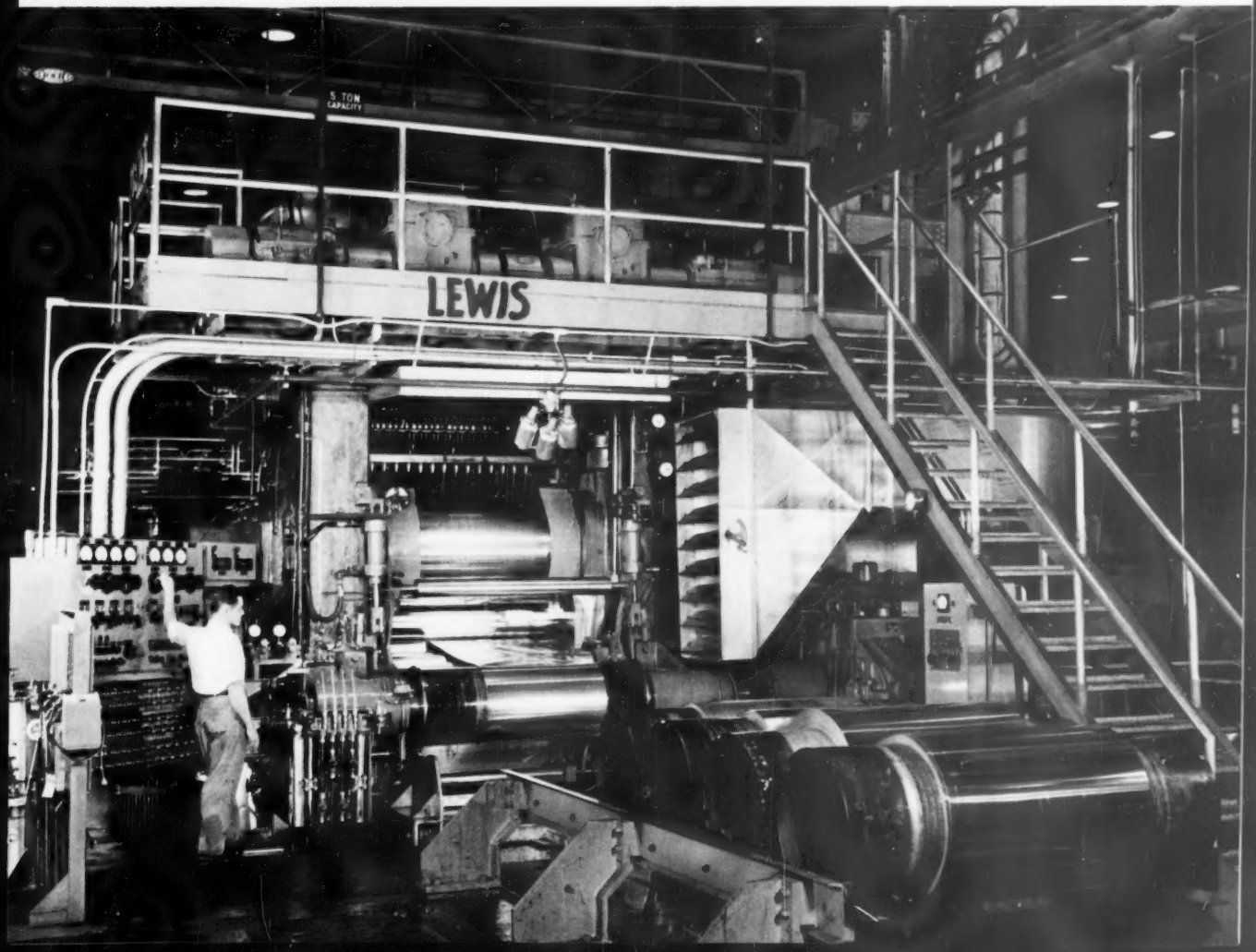
ALCOA ALUMINUM

SCREW MACHINE STOCK

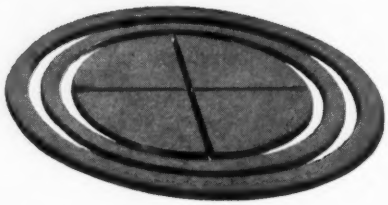
BLAW-KNOX

Blaw-Knox designs and builds a full range of aluminum foil mills complete with auxiliary equipment to meet individual requirements. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

9½ and 34-inch by 60-inch Foil Mill

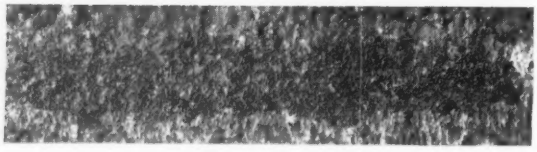


Stainless cutting

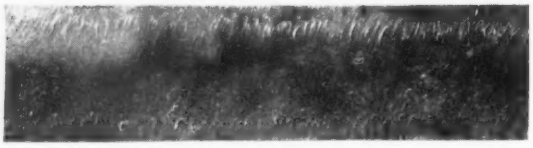


improved 5 ways

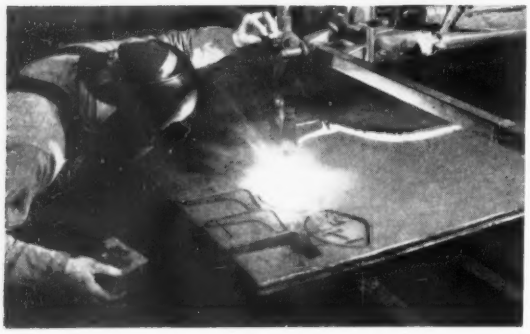
with Heliarc service from Ryerson Steel



Powder flame-cut stainless



Heliarc-cut stainless



This ultimate in stainless shape cutting is another Ryerson plus service. Ask about this service when the following advantages are important to you:

1. Clean edges free of powder contamination—and even smoother than hack-sawed edges.
2. Easier finishing because edge hardening is minimized.
3. Substantially less carbide precipitation (loss of corrosion resistance) than with any other flame cutting process.
4. Machining greatly reduced or eliminated—edges ready for welding or finishing.
5. Distortion and discoloration held to a minimum

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

STEEL
The Metalworking Weekly

Metalworking Week ®

October 17, 1960

No Steel Price Hike, Says Continental's Severns

"I do not see a steel price increase this year with business conditions the way they are," states Edmond P. Severns, chairman and president, Continental Steel Corp. He adds that an unexpected strong pickup in steel business before yearend might lead to an industry-wide price adjustment to cover wage increases effective Dec. 1. He expects his firm to continue operating at 80 per cent of ingot capacity—its current rate. The firm has lifted its ban on overtime—to get out rush orders rapidly.

Patton Says Research Is Answer to Foreign Competition

Thomas F. Patton, president, Republic Steel Corp., told the Ohio Society of New York that "an answer to many of our problems lies in research—into human attitudes as well as technological processes." He referred specifically to the problem of foreign competition and pointed out that "some of the largest steel plants in Western Europe and Asia have been made the equal in every respect of the best in the American industry."

Kennedy Outlines His Depreciation Reform Philosophy

"Both Europe and the Soviets have modern plants. We (U. S. industry) can't compete if our plants are out of date. We must make certain there's proper encouragement to plant modernization," Sen. John Kennedy told members of the Associated Business Publications in New York last week. "Wherever we can be certain that tax revision, including accelerated depreciation, will encourage modernization of our capital plant—and not be a disguise for tax avoidance—we should provide such revision."

The Business Gift Parade Still Marches On

If you're among the growing number of industry executives who would like to do away with business gifts at Christmas, be prepared for some tough competition. The mails are already full of promotional pieces. And three surveys find the practice on an upswing. *Sales Management* says 82.4 per cent of 912 companies surveyed will spend as much or more this year as they did in 1959. *Salesweek* looks for a small increase over last year's expenditures. *Printers' Ink* claims corporate gift giving has climbed to almost $1 billion annually. The Business Goodwill Advisory Council again urges

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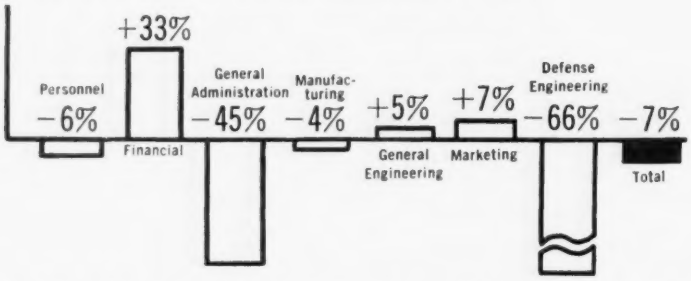
you to make the gifts of modest value; select them individually; choose only useful, dependable items.

Executive Demand Is Down but Due to Rise



The chart above shows the percentage change in demand for executives during this year's third quarter vs. the same period of last year. Based on a nationwide survey by Heidrick & Struggles Inc., Chicago, it shows demand was 7 per cent below the year-earlier rate and 2.3 per cent below the level in 1960's second quarter. But the executive recruiting firm reports that demand turned slightly upward in September and may be on the rise again.

Imports Climb in August

U. S. general imports during August totaled more than $1.2 billion—up 6 per cent from the July figure and 3 per cent above the August, 1959, total. The Commerce Department says imports for 1960's first eight months surpassed $10 billion—up 2 per cent from the like 1959 period. Imports of metals and manufactures rose in August, while imports of machinery and vehicles declined.

Government Personnel Will Learn Export Promotion

The Commerce Department has initiated a training program for key foreign service personnel that is designed to sharpen their effectiveness in helping U. S. industry expand foreign markets. The four-week series of lectures and discussions will cover trade policies; practices; laws; taxation; the effect of labor, productivity, costs, and credit on international trade; and other topics.

Canada Fights Hike in Valuation of Its Exports to U. S.

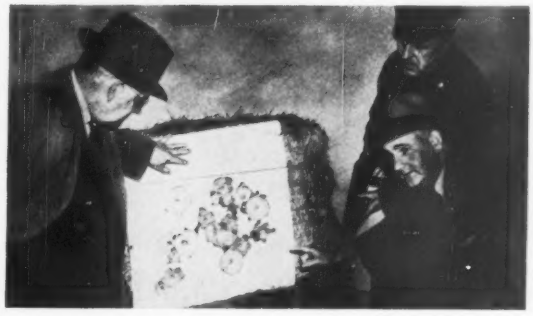
A case due to go before the U. S. Customs Court in November has significance for world-wide metalworking. Acme Steel Co. of Canada is appealing a U. S. Customs ruling that raised the valuation on steel strapping and metal seals the firm sends into the U. S. The Canadian Manufacturers' Association is holding a meeting this month to find a way to have the valuations readjusted.

Russian Education Program Excellent, Say Engineers

A six man team, just back from a month's tour of Russia sponsored by Engineers Joint Council, reports: Not more than 20 per cent of USSR high

school students are directly admitted to higher education; others must first spend two years in industry . . . The 20 per cent get practical work in industry as part of their education . . . Of the 14,000 to 16,000 graduates of U. S. technical schools, not more than 1000 are of the quality of those produced by Soviet techniciums which graduate 250,000 annually . . . About one-third of the students are women.

Sylvania Unveils Gains in Electroluminescence



A switch plate that will glow for more than five years at a cost of less than 5 cents per year (left), an electroluminescent panel that is not extinguished even by the firepower of a police riot gun (right), the application of the principle to electronic equipment (to provide visual "read out" for use in message systems, data processing, and radar), and other related developments have been unveiled by Sylvania Electric Products Inc. Sylvania's Panelescent lamps are already used in dashboards of Chrysler and Imperial cars, telephone dials, table tops in the cocktail lounge of the *N. S. Savannah*, night lights, and other areas. Sylvania envisions highway pavement that can be "turned on" at night, and entire skyscraper walls that glow in the dark.

Armco Seeks to Enlarge Steel's Construction Role

Logan T. Johnston (left), president, Armco Steel Corp., and Carl Koch of Carl Koch & Associates seal a pact under which the residential architects will "design a multiple family, garden type, apartment dwelling making maximum intelligent use of steel." Mr. Koch thinks new steel components can significantly reduce building costs. Armco is seeking a fresh design approach in residential architecture.

Gray Iron Intensifies Its Marketing

"Rice Bowls to Rockets" is the theme of a new film by the Gray Iron Founders' Society. The first in a series, it was previewed in Cincinnati last week. Designed to bring metalworking material buyers up to date on potential uses for gray iron, it's part of a marketing program now in its third year.

Norge to Market Coin-Operated Dry Cleaning Appliance

Norge Div., Borg-Warner Corp., has jumped into the automatic vending boom with a do-it-yourself machine to dry clean clothes. Judson S. Sayre,

Norge chairman, says the machine will "multiply dry cleaning sales volume from five to ten times and build a new industry." Norge will build a special distributor organization to market the product—which cleans 8 lb of clothes for $1.50. The first market drive will begin in eight cities during the next two months.

Automakers Boost Aluminum Consumption

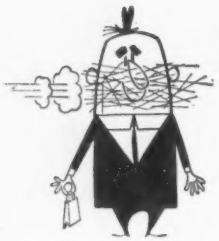
Expect carmakers to consume 379 million net pounds of aluminum during the 1961 model year. V. E. Flaherty, Kaiser Aluminum's automotive industry manager, figures the net weight of aluminum per car will average 62.1 lb (vs. 54.4 lb in '60). Prime reason for the rise: Aluminum engines being introduced by all auto companies except Ford and Studebaker-Packard.

Plastics Shoot for Bigger Auto Market

An all-plastic auto at the current National Auto Show in Detroit emphasizes the plastics industry's drive for a bigger share of the auto market. The average '61 car contains more than 22 lb of plastics (vs. 11 lb seven years ago). Society of the Plastics Industry says the 22 lb of plastics have replaced 150 lb of metal. SPI estimates 1970 plastic usage at 60 lb per car—for a 500 million lb market. Nearly 6000 firms employing 200,000 will turn out 6.5 billion lb of plastics this year.

Customers Get Kick from Kaiser's 'Toes'

West Coast steel buyers are getting a kick from Kaiser Steel Corp.'s "toes"—and liking it. The secret: "Toes" stands for teletype order entry system, which is lopping as much as five days off the time required to put an order into the works at the steel mill.



Straws in the Wind

Expect shipping costs to rise as a result of the new labor contract between lake carriers and the Seafarers International Union, estimated to cost the shippers $1.5 million annually when extended throughout the industry, says Jack Leitch, president, Upper Lakes Shipping Co. Ltd., Toronto . . . Fire cost industry close to $184 million last year—up $1.3 million from '58, reports the National Fire Protection Association . . . The industrial diamond industry had record third quarter sales of $19 million.

Metalworking Pulse

The Business Trend: STEEL's industrial production index slipped a notch or two—to a preliminary 150 (1947-49 = 100)—for the first time since the Labor Day week. Chances of adding much strength in the fourth quarter are slim. **Autos:** The big question in motordom is whether or not producers will stick to their 1.9 million unit, fourth quarter schedule. Most observers say they won't. **Steel:** Output was continued at a steady level pending changes in user needs.

- **INDUSTRIAL PRODUCTION**
  - Week ended Oct. 8 . . . . **150†**
  - Year ago **118**

  Details on Page 101
- **PASSENGER CAR PRODUCTION**
  - Week ended Oct. 15 . **145,000***
  - Year ago **133,430**

  Details on Page 98
- **INGOT PRODUCTION RATE**
  - Week ended Oct. 16 . **54.6%†**
  - Week ago **53.4%**

  Details on Page 178

†Preliminary. *Estimated.

Copyright 1960 by STEEL, Penton Building, Cleveland 13, Ohio

MUSIC TO A CUSTOMER'S EAR . . .

Once there was a manufacturer who looked everywhere to find tubing that would solve a knotty production problem. But tolerances were so close, specifications so rigid, that conventional sources couldn't help him. Then he read about Michigan Seamless' TAILORED TUBING—made by a specialty mill with 33 years' experience! Result? Our production-engineering-metallurgical group quickly presented a solution that was "music" to the ear of this worried manufacturer! If you have a tough job for tubing, write or wire, we'll supply the answer!

MECHANICAL, AIRCRAFT, PLAIN AND FINNED HEAT-EXCHANGER TUBING

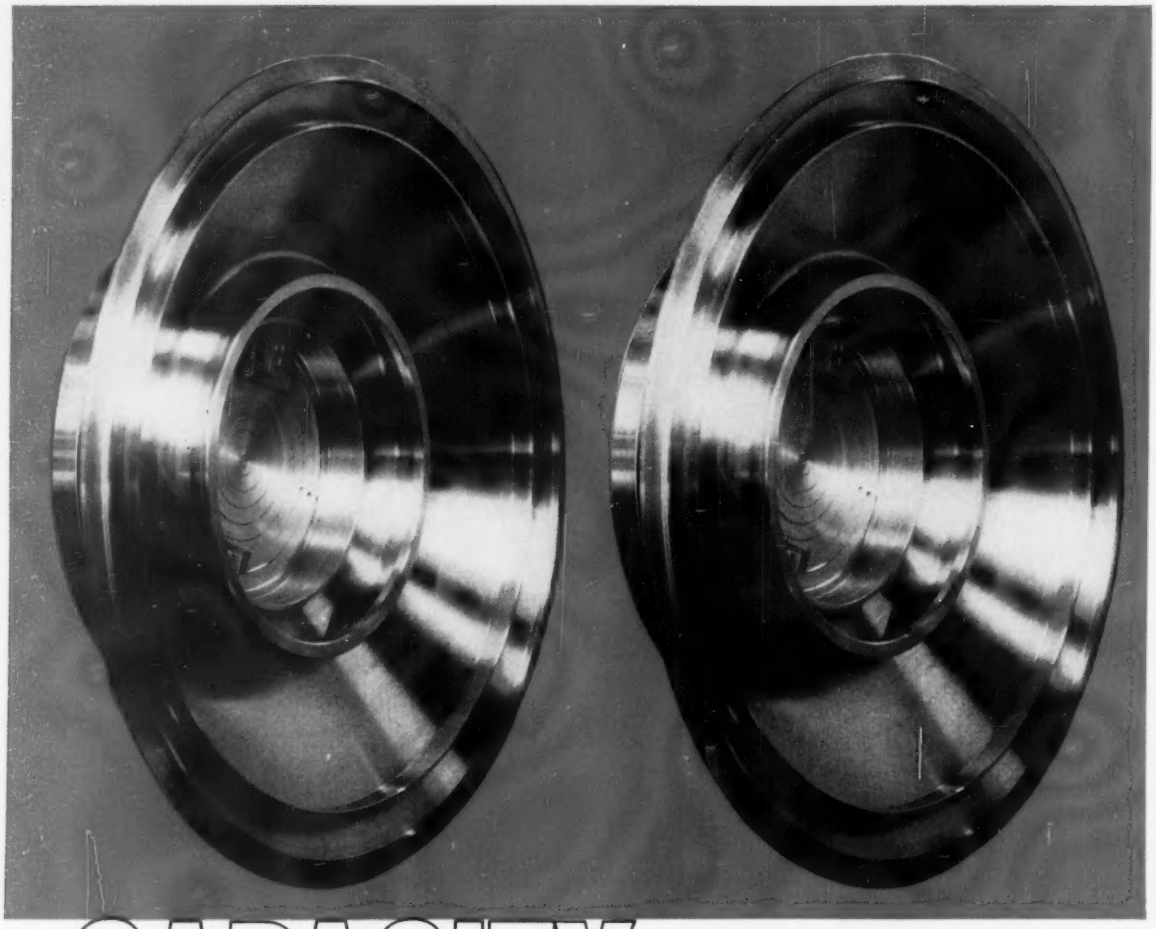
MICHIGAN SEAMLESS TUBE COMPANY

SOUTH LYON, MICHIGAN

A SUBSIDIARY

GULF STATES TUBE CORPORATION

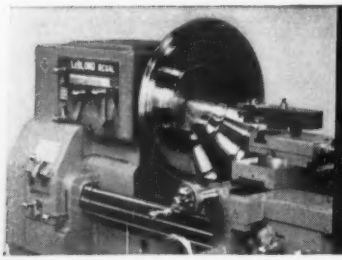
ROSENBERG, TEXAS



CAPACITY. *Reason enough to buy LeBlond*

These disks are supports for Pratt & Whitney jet engines. Caval Tool & Machine Co., Newington, Conn., took the job off a vertical turret lathe and put it on a LeBlond Regal Plain Bed Gap Lathe. The Regal machines it in 85 per cent of former time. Setup is easier. Tool life increases. The vertical turret lathe is freed for work better suited to it. Pratt & Whitney Aircraft gets its engine supports faster, with finer finish, and to closer tolerance.

Eleven extra inches of swing in this plain bed gap lathe add great versatility to the Regal at small extra cost. Such bargain extra capacity is a powerful incentive to buy a lathe. It's reason enough to buy LeBlond.



THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LEBLOND *of Cincinnati*

Turning Point in Labor?

James B. Carey, president of the International Union of Electrical, Radio & Machine Workers, told STEEL's editors in an interview 15 months ago:

"I owe GE a strike."

Mr. Carey has been trying to fulfill his promise since Oct. 2, 1960. We think he has bit off more than he can chew.

GE employs 240,000 people at 166 plants. The IUE has 70,000 members working in 55 plants.

With minority representation, Mr. Carey had no chance from the start to close GE down tight.

In fact, many rank and file members of the IUE are not in sympathy with his actions. Local 301 at Schenectady, N. Y., first voted against the strike but was later persuaded to back the international union.

Several other IUE locals, including those at Pittsfield, Mass., and Bridgeport, Conn., were prevented by Mr. Carey and his associates from accepting the company's offer of a three year contract with a 3 per cent wage increase now, 4 per cent more Apr. 2, 1962, and the elimination of a cost-of-living escalator clause.

Mr. Carey wanted a two year contract with a 3.5 per cent wage increase each year and continuation of the escalator clause.

We also suspect that he wanted the negotiations with GE to follow the slam-bang tactics many unions have used in recent years:

The union brings a fantastic offer to the conference table (Mr. Carey's would have cost GE $500 million). The company counters with less than it hopes to settle for. After prolonged haggling, both sides make concessions. Finally, at the strike deadline, the company gives in a little more. The union gets credit from its membership for squeezing out something extra. The company settles for more than it can afford, but a walkout is averted.

If we read the signs right, that type of negotiation is out the window. The Careys can no longer announce, "I owe GE a strike," and get away with it.

As in the case of GE, management has been coming around to the view that it must do a better job of explaining to workers that excessive wage costs can only mean higher prices, loss of markets, and loss of jobs; that it must deal fairly at the bargaining table; that it need not submit to the bulldozing tactics of union leaders.

What we are witnessing could be the turning point toward more enlightened labor-management relations. The day may be coming when the workingman will have more to say than his union boss about what happens to his job.

Irwin H. Such

EDITOR-IN-CHIEF

NEW SLANTS ON HEAT PROCESSING FROM SELAS

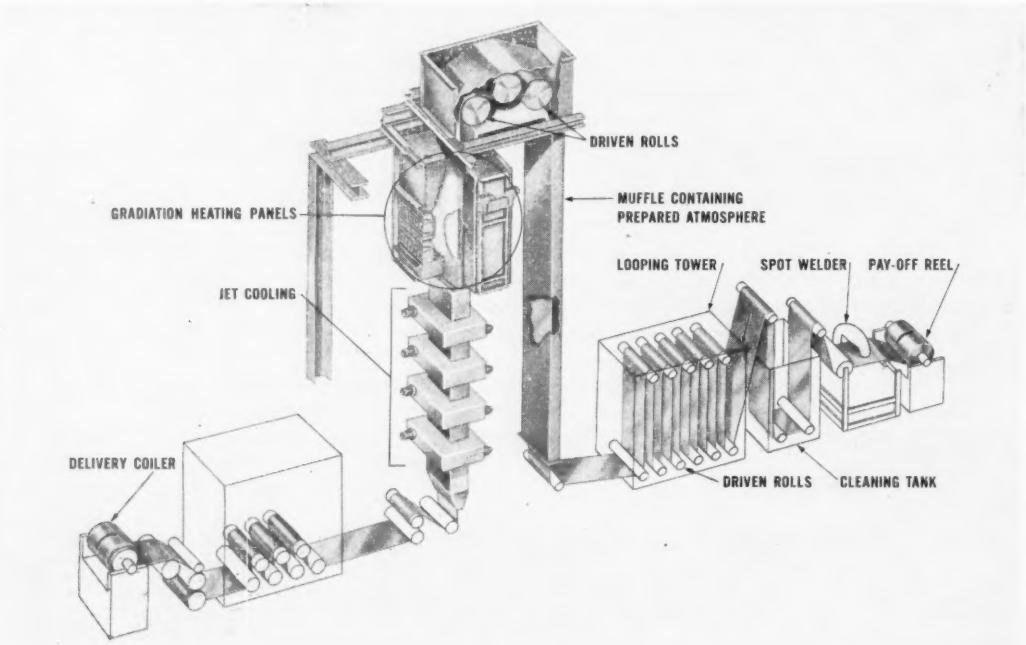
are these <u>your</u> objectives stainless strip continuous furnaces?

- **Top strip quality in terms of surface condition, microstructure, mechanical properties and flatness**
- **Uniform heating, with long muffle life and ease of muffle replacement**
- **Compact design to save floor space**

These were the main objectives of Somers Brass Co., Waterbury, Conn. — achieved when they selected a new continuous annealing furnace for stainless steel strip and other refractory alloys, designed and built by Selas engineers. It has been in production since July, 1958.

The furnace was designed for maximum strip speed of 50 fpm. It can handle strip 0.001 to 0.020 in. thick and 8 to 26 in. wide.

Up and over vertical design saves valuable floor space, provides controlled atmosphere protection. Available in 2000, 4000 and 6000 lb/hr capacities.



in selecting annealing

The muffle (6 x 36 in. in cross-section) is arranged in an inverted U. The vertical lengths are 5½ ft. apart and the horizontal cross-over is about 27 ft. above floor level. Compared to horizontal muffles, this arrangement *requires less muffle material, extends muffle life, provides uniform strip temperatures* and *improved atmosphere purging.* The entire strip line length is only 50 ft. Heating and cooling operations require only 10 ft. of floor space.

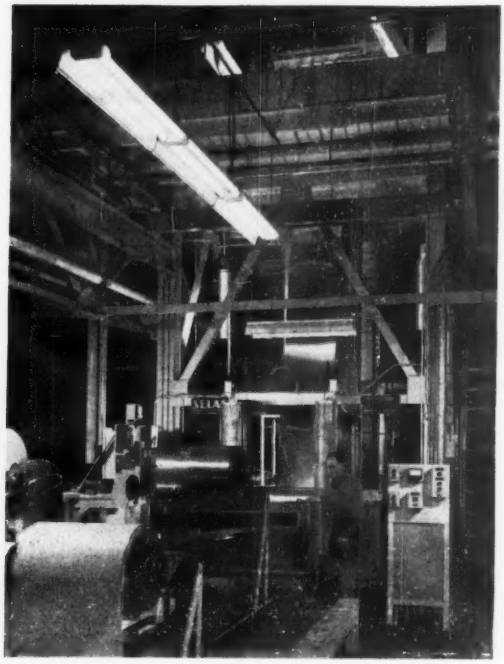
Selas Gradiation® method of uniform muffle heating in the two opposing burner panels, with burners patterned in four horizontal rows, assures uniform temperature across the strip width. The strip is equidistant from the radiating muffle-wall over its entire width.

Burners are fired by a gas-air mixture from a special Selas Combustion Controller installation. This premixes to a desired ratio and pressure, feeds through a single pipe system to the burners.

Somers' customers report improved die and tool life in deep-drawing operations with the stainless strip from this furnace—attributed to *uniformity of annealing,* and *improved surface completely devoid of surface oxide or other imperfection.*

Want to know more about this new Selas method of continuous stainless steel strip annealing? We can serve your needs for complete annealing line or furnace only. Contact our Steel Mill Division office, 300 Mt. Lebanon Blvd., Pittsburgh 34 (Phone: LOcust 1-0115) or our Furnace Division, Dresher.

SELAS CORPORATION OF AMERICA
210 Dreshertown Road, Dresher, Pa.



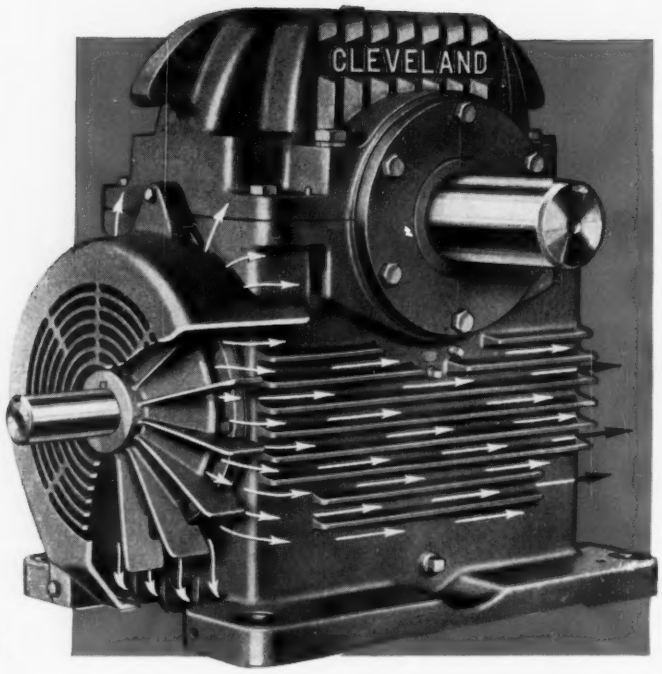
Total strip line length only 50 ft. Simple threading device, built into muffle system, permits rethreading in minutes, without loss of atmosphere, in event of tear-off of strip

SELAS

HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

GRADIATION is a registered trade name of Selas Corporation of America



Fan cooling for Increased HP Capacity is Not New... *to users of Cleveland Speed Reducers*

As far back as 1944, Cleveland Speedaire Worm Gear Reducers (shown in both the announcement ad and cutaway photo below) were providing industry twice the load carrying capacity then available from standard worm gear units of equal frame size. Even then, it was *fan cooling* that did the trick—because fan cooling was and still is the most practical method of heat dissipation.

On the new, higher horsepower Cleveland's (shown in top cutaway photo), a small, specially designed fan—equally effective in either direction of rotation—is located on the worm shaft's input side. Fan size and design permit a smooth, more effective flow of air beneath, above, and around all sides of the reducer.

Mounting the cooling fan on the WORM shaft input end is a very definite Cleveland advantage for when the fan is mounted on the *opposite* side, a second oil seal is needed. This results in additional friction loss due to seal drag—and is another point where oil leakage could occur.

Remember, it was Cleveland design engineers who pioneered both fan cooling and centrifugal casting of bronze gears—and after sixteen years of rugged field usage in all types of industrial plants, have now incorporated these features in all units (from 3 to 12-inch centers) of the new standard Cleveland Speed Reducer line.

Get the story of these new speed reducers from your Cleveland representative, or write today for free 36-page illustrated Bulletin No. 410 that contains complete engineering information. Either way, you will get the answer to improved speed transmission—at savings of 50% or more on per horsepower cost!

A 1944 CLEVELAND AD
"Announcing A Fan-Cooled Worm Gear Speed Reducer ... SPEEDAIRE."

CLEVELAND
Worm Gear
Speed Reducers

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

Carey Charges . . .

'GE Is Out to Break the Union'

He's Miffed at GE for . . .

1. **Publicizing its offer after making it to union reps at the bargaining table.**

2. **Putting all the terms on the table at once.**

James Carey, President, IUE

GE Strike: Fight Over 'Boulwareism'

JIM CAREY and his International Union of Electrical, Radio & Machine Workers are really striking at what they call "Boulwareism" in the walkout against General Electric Co.

The disagreement over economic issues is not explosive enough to touch off the conflict that appears to be shaping up. The first spark goes back to 1947.

• **Program Is Born**—Following a bitter, company-wide strike in 1946, Lemuel R. Boulware was given the job of returning GE to a business-like approach in labor relations. Mr. Boulware was then manager of GE's wholly owned subsidiaries and had considerable marketing experience.

The philosophy developed then is still the basis for GE's industrial relations, although Mr. Boulware is now retired from his GE vice presidency. He adapted his marketing methods to industrial relations. The approach has proved so effective (although hated by union agents) that this is the first company-wide strike suffered by GE in 14 years.

• **What It Is**—The company regards union officials as the professional representatives of employees just as lawyers represent clients. The premise is incorporated into its bargaining procedures. Example: When the union representatives have had their say at the negotiating table (just as a customer may complete his case for different terms or conditions affecting a GE product), the company comes in with its offer or proposition. "It contains all that the company believes is indicated in the balanced best interest of employees, owners, customers, other interested businessmen, and general citizens," says GE.

GE also puts in writing: "This is all we can see now that can be done. Upon any evidence from any source that the offer should be changed in the balanced interests of all concerned, GE will reconsider."

Except for the 1948 settlement (union officials were so surprised by the completeness of the company's offer that they accepted it practically unchanged), all proposals have been changed some.

• **Why Carey Objects**—Mr. Carey and most labor officials complain loudly about GE because:

1. The company communicates with its employees the year around.
2. The company publicizes any offer after it has been made to the union representatives during bargaining.
3. The company puts all the terms on the table at once.

GE officials say union representatives particularly object to the last procedure because the practice makes

it difficult for them to "deceive the workers into thinking that the union has dragged the last penny, the last benefits from recalcitrant management."

• **Filling a Void**—"Skillful propaganda by certain union officials and other of our critics has filled the communication void created by our traditional reluctance to speak up about our good intentions and performance," Mr. Boulware once asserted.

"That has prevented too many people from recognizing the growing gap between the thoroughly good theory and potentiality of unions and too frequently bad ideas, practices, and proposals of certain unions we had to deal with."

• **IUE Hunts for Issue**—The IUE is selling this strike to its members on a "save our union" basis, which explains part of the emotionalism that has developed since the workers went out Oct. 2. Many probably favor GE's economic offer. "Advisory" votes in all IUE locals in GE showed a substantial sentiment against a strike for better contract terms.

Local 301 in Schenectady, N. Y., voted 5033 to 2895 to accept the offer. So did ten other important units.

The showdown is coming.

Disagreement Centers on SUB, COL, Job Security

The major differences between GE and the union are not over wages, though the company offered less than the union demanded.

Stumbling blocks are the cost of living provision which the company wants to drop and a supplemental unemployment benefits program which the firm has rejected.

GE's offer provides for a 3 per cent wage increase now and 4 per cent Apr. 2, 1962, plus additional insurance and pension benefits. On the job security issue, the company proposes a complex retraining-reassignment program for employees laid off or whose jobs become obsolete.

The IUE rejects the job security proposal on the ground that no provision is made for seniority or union participation in the program.

Work Rules Must Be Dealt With on a Local Level

"GOING to the summit on work rules is like trying to carry a mattress upstairs—it's hard to get a grip on the subject."

So said R. E. Lowell, labor relations manager for U. S. Rubber Co., New York, at a conference on work rules and technological change in Cleveland. All speakers at the session sponsored by Associated Industries of Cleveland agreed that people are industry's most important problem.

• **Advice**—Mr. Lowell advised:

1. Write work rules at the local level.
2. Negotiate them on the local level.
3. Make any company-wide contractural statement on the subject (if the union insists) as broad and general as possible to allow room to operate locally.

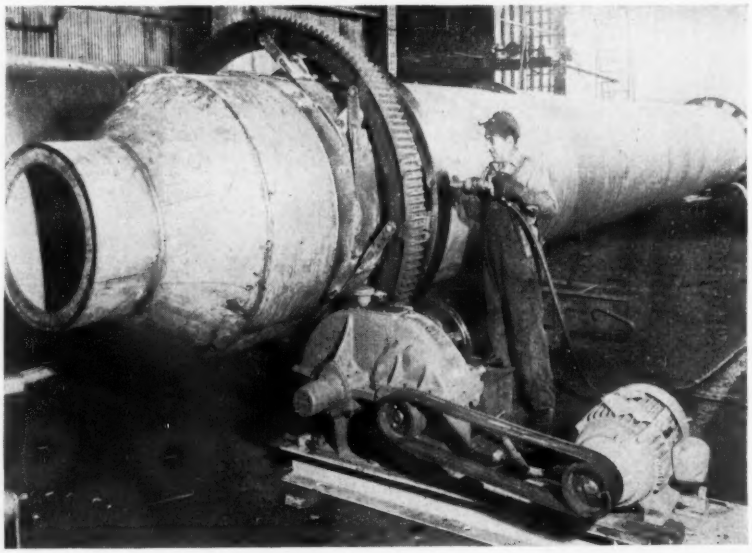
The U. S. Rubber manager believes that work rules, supplemental unemployment benefits, severance pay, and other contractural arrangements can never be the full answer to technological change.

• **Counsel**—E. Robert Livernash, professor of business administration at Harvard, pointed out that the difficulties of displacement will increase during the 1960s because new entrants to the labor force will be coming in at a doubled rate and because technological change will be even faster in the next ten years than it was in the last decade.

"Few companies have the resources to do the retraining job all by themselves," he says. "The approach will have to be on a community-wide, rather than company-wide, basis."

• **Warning**—Yet, Mr. Livernash cautioned against being impatient with our collective bargaining system. "It has contributed to free enterprise and has helped bring substantial progress in labor relations over the last two decades."

He adds: "We wouldn't be too



ROTARY CALCINER, a stainless steel vessel that's 48 ft long and 54 in. in diameter, is used to reduce copper by the salt coke segregation process. The unit, designed to operate in a gas fired furnace at temperatures up to 1500° F, breaks down lime-laden ores to produce metallic copper. Standard Steel Corp. built the calciner. Allegheny Ludlum Steel Corp., Type 316 stainless steel plates are used

critical when we see what is happening in the rest of the world. European and most other nations take the legislative route in regulating work rules. The U. S. is almost unique in its collective bargaining approach."

Oil System Boosts Iron Technology

A NEW concept of injecting oil with high heat content into the bottom of blast furnaces is expecting to boost hot metal production and lower costs. It was developed by Esso Research & Engineering Co., the scientific affiliate of Standard Oil Co. (New Jersey).

The company says the technique promises to be "one of the most important iron manufacturing developments in the last 20 years." Esso Research says it worked two years in solving the complex problems involved in the concept and the development of an injection and control system.

The concept takes advantage of the chemical properties of oil as well as its heat producing ability. Blast furnaces produce pig iron in hot liquid form by extracting oxygen from iron oxide.

The blast furnace is actually more of a chemical plant than a furnace, Esso points out. Oil contains carbon and hydrogen which contribute additional reducing gas to speed the reduction of ore.

With the new fueling method, oil can be injected along with heated air.

• **Pilot Plant** — In developing a suitable system, the company designed, built, and operated a pilot plant simulating that part of a blast furnace most critical to oil injection. A unit of the system was later tested in a full-scale furnace.

The company notes that some U. S. and European steel firms have been working along similar lines with natural gas injection, and reports indicate the Russians are using natural gas in some blast furnaces to increase their ironmaking capacity.

Esso is continuing work on experimental and full scale furnaces to get accurate data on operating costs and production.

Lehman Defends the Yearly Model Change

THE REGULAR model change is the "orderly and economical way of doing things," asserts Herman F. Lehman, General Motors Corp. vice president and general manager of the Frigidaire Div.

• **Pressure Is Good**—"I believe progress results from the pressure system. The regular model change keeps pressure on our entire organization, from product planners and designers to those whose job it is to tell a convincing and enticing sales story to the public. It is more than pressure. There is an excitment that runs through the whole organization, keeping us flexible and responsive to consumer needs and preferences," Mr. Lehman declares.

• **Speeds Progress**—Mr. Lehman says he's "convinced that the planned model change speeds the development of meaningful features and improvements." But he adds that such features can be—and sometimes are—added in the middle of a model year.

• **Adds Freshness**—By coming out with a new model each year, we date our products for freshness, notes Mr. Lehman. "When a customer buys a 1961 model Frigidaire electric range, she has the complete assurance that the model incorporates all desired additions, necessary changes, and other improvements as of 1961. It's as fine a range as we can make today."

• **Why Styling Change?**—The reasons for a styling change are simple and economically sound, Mr. Lehman contends. "Our designers . . . are endeavoring to create improved styling which will better satisfy the changing tastes of the customer. Also, we try to incorporate other benefits, such as convenience."

He says it is economical to program toward a calendar deadline. "By co-ordinating all activities toward one common point, we are able to produce the best product at the lowest cost." He emphasizes that he is referring to improvements in materials, manufacturing processes and tooling, and plant layout, as well as design for appearance and new features.

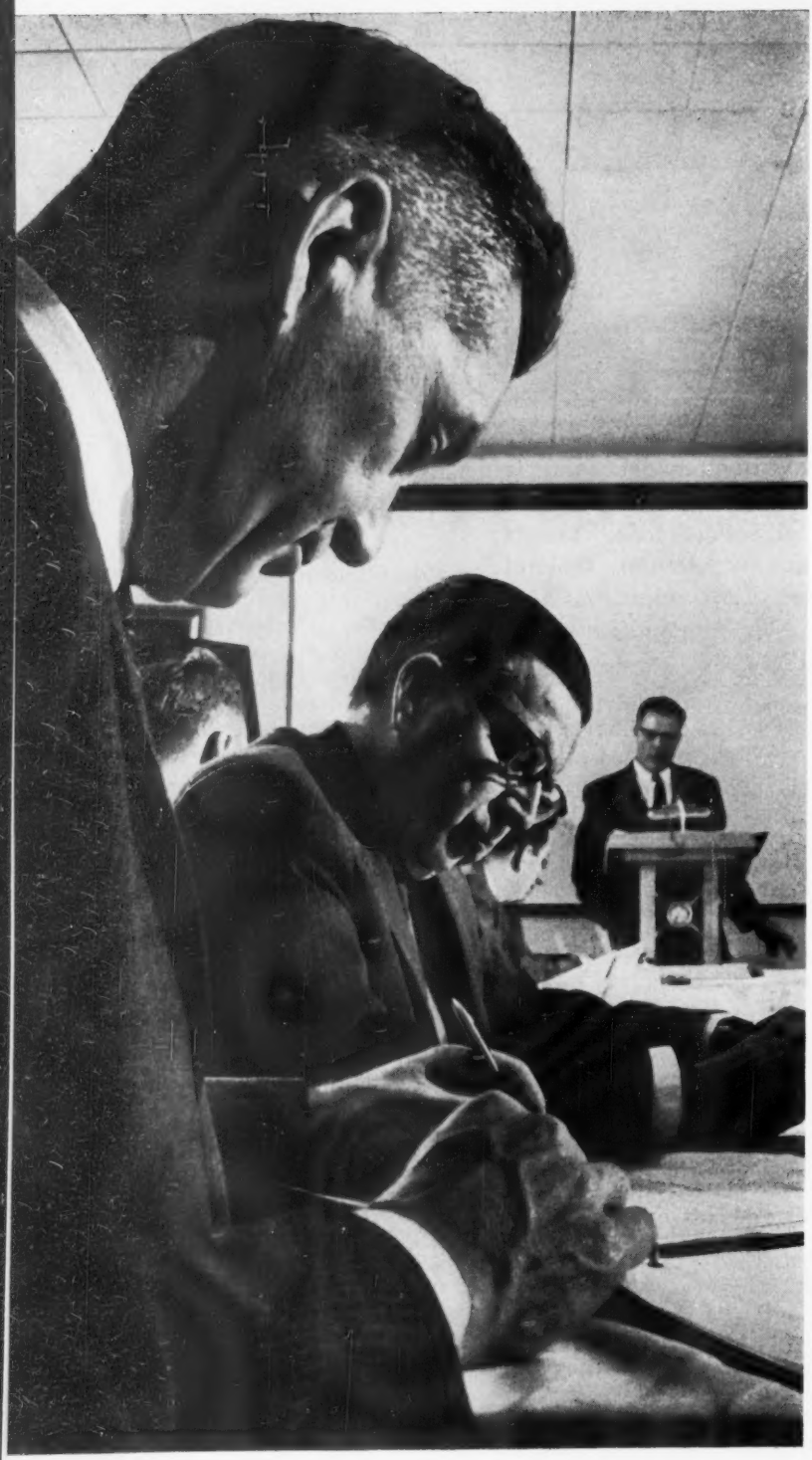
• **Price Hikes Lag**—Mr. Lehman points out that, since 1947, the consumer price index has risen 32.5 per cent, while the index for major appliances has edged up only 5 per cent. That has been possible because of wise investments and foresighted planning, not despite large expenditures, he declares.

He says that, in 1951, the average U. S. hourly wage earner had to work 240 hours to pay for a '51 model refrigerator, while the worker of today can buy a "greatly improved 1961 model" for only 113 hours of work.

• **More Reliability**—Mr. Lehman asserts that greater dependability is built into each successive model. He says that 1960 Frigidaire refrigerators required 61 per cent fewer service calls than the comparable models in 1948. He says the frequency of service on his firm's electric ranges declined 28 per cent and automatic washers 67 per cent over the same period.

• **'61 Looks Good**—Mr. Lehman predicts that 1961 sales of major appliances will be comparable to those of 1960—down 6 per cent from 1959's, but up 8 per cent from 1958's.

Armco Builds Up Managers' Skills



Importance of people is emphasized in training course. They generate dollars, says Logan T. Johnston, president. Read how this company trained 2500 of its management personnel in a year

ARMCO Steel Corp. is strengthening its management muscle. In one year, it has put more than half its 5000 managers through a packaged course that has given them skills the company found can be taught—planning, organizing, motivating, and controlling—and shown how they should be applied.

Throughout the course, Armco emphasizes the importance of people. Says Logan T. Johnston, president, "We concentrate on the people who generate dollars instead of concentrating on dollars directly."

Since the course was inaugurated, information regarding it has been requested by 244 other companies, large and small; government organizations; and 42 universities.

Armco is freely offering information and has approved adaption of films it has been showing to its managers for use by other organizations.

• **It's Adaptable** — The program, called "The Profession of Management," is both mobile and flexible. Adaptable to all levels of management, it's being presented to Armco managers from Middletown, Ohio (company headquarters), to Buenos Aires and from Los Angeles to Knokke, Belgium.

It's basically a movie-conference training method.

The package includes six films which set forth in condensed, easy to understand form the skills the firm is emphasizing

The films, like pictorial textbooks, fit into a schedule of 12 conferences. The flexible program may be presented in a week, as it was in Europe and South America, or it may be spread out over many weeks. Scripts of each film—management

lectures on celluloid—are part of a manager's homework kit. Armco managers—from vice presidents to foremen—teach the course, guided by a conference manual.

• **Situations Dramatized** — Lectures on modern management techniques by Louis A. Allen, management consultant, have been put on the six films (16mm, black and white, produced by Jam Handy Organization Inc., Detroit). Each runs about half an hour. Mr. Allen takes a leading role in each film, making wide use of visual aids to explain management principles. Professional actors help to dramatize case situations.

The movies are shown twice, with plenty of time for discussion between showings. "The second time a manager sees a film, he *really sees it*," explains William Verity, director of organization planning and development. "The films are basic. Conference material is changed to fit the level of management and the location.

Broad corporate problems are studied at the vice president level. Plant problems are discussed for plant managers. Single department situations can be examined at another level. The program can be tailored for foremen who direct 10 to 15 men. Certain material can be put in or taken out to fit each group.

Says R. S. Gruver, vice president-personal and public relations: "The conference method is the most important aspect of the program. Here a live problem—an Armco situation—is examined. Line managers are leading the conferences throughout the company; we're not using professionals."

• **Managers Instruct** — Managers turned instructors say they get benefits in addition to the course (see the appraisal by Jim Townsley, Armco general foreman).

"People who serve as discussion leaders feel something special has happened to them," says Robert M. Nelson, corporate co-ordinator in Mr. Verity's group. "These people are broadening and developing themselves as communicators. They are gaining additional stature before those who report to them."

Mr. Verity points out that the program has had "a tremendous unifying effect on the company by bringing the various parts of Armco closer together." Case in point: The manner in which the program was carried to Armco's South American managers by A. R. Edwards, president, Armco International Corp.

Usually, Mr. Verity says, conference sessions are held once a week or every other week. In Argentina, the 12 conference meetings (each session lasting 2 or 3 hours) were conducted within a week. In the following week, each South American manager brought before the group his most important problem.

"We got these South American managers talking about management principles in terms of 'The Profession of Management' course," Mr. Verity explains. "We were able to tell them what Armco expects of them as managers. And we got from them their most important problems."

Joseph Holton, Armco's regional director in Europe, presented the

Jim Townsley believes he is doing a better job now as an Armco Steel Corp. manager. Mr. Townsley, general foreman-assigned maintenance, Middletown, Ohio, Works, completed Armco's "Profession of Management" course and has put its principles to work. He says:

"For me, this course has brought into focus all of the concepts of a manager's job; it has shown me what is expected of a manager. I'm doing a better job of thinking problems out and a better job of planning.

"Here's an example: Recently, I had to set up four men for turn or shift jobs in a cold strip mill. I had to determine what I wanted to accomplish through these jobs. I did my planning on paper: Set up a timetable, made forecasts, wrote job descriptions.

"This made it easier to sell my superiors on the need for the jobs. We had in mind exactly what we wanted the men to do on the four jobs. These men too are better supervisors by knowing exactly what is expected of them.

"I'm doing a better job of forecasting. I learned this from the planning part of the 'Profession of Management' program. This helps us eliminate the crash program approach to projects. We do a better job of planning.

"I'm making better use of our staff people. I'm giving them jobs I used to do myself. It's a more effective use of our people.

"I'm amazed how the course can be adapted to anyone."

program in similar fashion for European managers in Belgium. It will be presented in England next month and later in France and Italy.

Mr. Verity says results are already evident: "Company problems are being handled in a more professional way by managers who have had the course. They're putting their problems down on paper: They're forecasting for the 'how' and the 'when.'"

• **Program Pays Off**—Case studies show how managers are applying the newly learned techniques:

At Armco's Baltimore Works (stainless steel bars and wire), a great number of orders are for small quantities. It was decided that the orders could best be handled with the use of an IBM 1401 machine.

That meant establishment of a complete, two year program—from order of the new machine to startup. Works Manager C. C. McElvain asked Wilbur Cole, works accountant, to set up the program. Mr. Cole applied principles learned in "The Profession of Management" course, that gave the works a blueprint for:

- Forecasting objectives—number of orders to be handled.
- Forecasting results expected.
- Planning for machine installation.
- Planning a training program for those who would operate the machine.
- Developing procedures, performance standards, new job descriptions.
- Establishing budgets, record keeping, and reporting processes.

"I doubt that we could have done the job as well without this organized method of thinking and planning," says Mr. Nelson. "We would have done some of the things required, but not all of the necessary planning without these guiding principles."

At the Butler, Pa., Plant, Robert Hindman, general superintendent, and Roy Tooke, works manager, have been "pricing out" their scheduled operations. They are taking a dollar and cents look at expected objectives and setting their goals in a scientific manner that provides for effective controls and avoids the injection of personal criticisms "Their meetings are more businesslike and they're getting better acceptance from their foremen," adds Mr. Nelson.

• **Need Was Great**—More than a year was required to develop the course. The basic program cost $200,000. But the need was great.

After World War II, rapidly accelerating growth of the company and the acquisition of new companies called for a modern method of teaching scientific management skills, tailored to fit Armco policies, to as many as possible as soon as possible. Here is how the company had grown:

- Ingot capacity had doubled to about 6 million tons a year.
- Mergers had brought in a third more employees, swelling the total to 44,000 in this country and abroad.
- Sales had quadrupled—to over $1 billion a year.
- Divisionalized management had become necessary. (There are six Armco divisions.)

As the need for more managers expanded, the supply of qualified men was becoming shorter. A 1956 company ruling made mandatory retirement of executives over 65. Since that time, a third of Armco's top executives have bowed out. By 1963, another 31 per cent will have retired.

• **Threat to Policy**—This posed a threat to Armco's publicly announced policy of promotion from within, considered vital to the company's continued growth. Also, managers new to Armco through mergers had to be indoctrinated in terms of the company's policies and practices.

The old way — bringing small groups of management people to company headquarters at Middletown for six-day consultations—would no longer work.

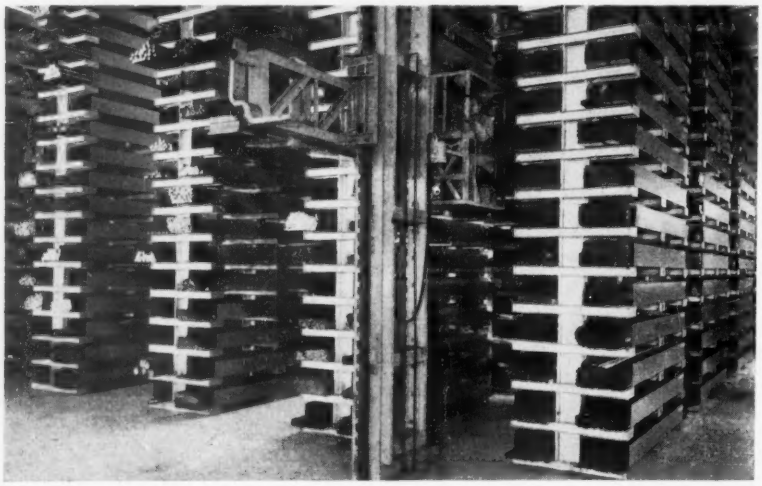
Mr. Verity and his staff were assigned to find an answer. They started looking for one in 1958. Their first plan was a "blooper," he says. Then, Armco discovered Mr. Allen when he came to Middletown from Palo Alto, Calif., to lecture on modern management techniques.

Mr. Allen, Armco, and the film producer went into a huddle and came up with the play that clicked.

• **Summing Up** — Mr. Johnston sums up the program and its results this way:

"A well educated businessman must have a broad understanding of the management of business. We think management is a profession. There is a lag in effectiveness if we show a weakness in corporate knowledge.

"We think that a vice president of finance or a vice president of research and development should have this training as much as any other executive. Even the chairman of the board can get some ideas. Then, too, it serves as a refresher. I've taken the course myself. I don't think there is anyone who can't find something in it."



THIS "FILING CABINET," a feature of Jones & Laughlin Steel Corp.'s new steel service center, Cleveland, can store 1500 sizes. It is designed to save space and speed handling. The stack rack is served by a mechanical handling device operated by one man

Sterling Forest: Plan for Creativity

THE DREAM: A community that stimulates creative use of brainpower by providing a pleasant place to work, a scenic place to live, and a place where cultural and educational facilities are in abundance.

THE RESULT: Sterling Forest, a 22,000 acre tract in Orange County, 40 miles northwest of New York City—just 65 minutes from Broadway. Planners hope it will attract research and engineering laboratories plus light industry, such as assembly and electronics. It's conceivable that the area may someday have the largest concentration of nongovernment scientists and researchers in the world.

THE DREAMER: Robert W. Dowling, president of the real estate and investing firm, City Investment Co., who has spearheaded such projects as Pittsburgh's Gateway Center, Philadelphia's Penn Center, and the redevelopment of downtown Akron.

Sterling Forest offers:

- 6000 acres in a parklike setting that are zoned for laboratories and light industry.
- 6000 acres set aside for recreation, including six major lakes stocked with bass, perch, and rainbow trout; an open air, legitimate theater; an area for special cultural attractions; one of the country's largest gardens, a 125 acre floral display containing more than 500,000 plantings.
- 10,000 acres atop hills, in valleys, and surrounding lakes that are reserved for housing.

• **Progress Report** — Construction was started in 1957. Since then, about $8 million has been invested in land development. Roads, power, water, and natural gas have been put in. Transportation is now available.

The community has a sprinkling of homes, plus guest cottages for visiting scientists, and an ultramodern lodge which companies have been using for high level think sessions.

Sterling Forest Corp., the subsidiary of City Investment which is developing the area, has built an international research building. It will quarter research crews of companies that are too small to build their own facilities and provide temporary space for other companies with facilities under construction.

Two divisions of Union Carbide Corp. (Union Carbide Nuclear Corp. and Union Carbide Ore Corp.) have located research centers at Sterling Forest.

Twelve companies are seriously thinking about moving research and production facilities to the community.

At least two universities are interested in building research centers there, and one thinks it may provide the ideal setting for a second campus.

• **Selling Points**—Planners believe they have the happiness formula at Sterling Forest. The setting has been practically unchanged since the Iroquois hunted the hills and valleys. Deer, beaver, otter, and squirrels still inhabit the area. But the molecule and the martini are only a few minutes apart by foot.

The Sterling Forest people believe that such surrounding will boost productivity and efficiency and reduce absenteeism and turnover.

They say a 150 per cent gain in worker productivity has been achieved in an integrated research, production, and residential center in West Germany.

• **Outlook**—When the project is fully completed (probably another seven to ten years) it will represent an investment of hundreds of millions of dollars.

If forecasts are realized, this area, which housed one of this country's earliest iron ore mining and blast furnace operations (the famous chain which stopped the British fleet from sailing up the Hudson during the Revolution was forged here) may become a blueprint for similar developments.

Unions Name Senators They Want Defeated... Bikemakers Win Tariff Case... Renegotiation Survey Completed

Machinists Blacklist 13 Senators Up for Re-election

John L. McClellan (D., Ark.)
Gordon L. Allott (R., Colo.)
Richard B. Russell (D., Ga.)
Henry C. Dworshak (R., Idaho)
Andrew F. Schoeppel (R., Kans.)
Leverett Saltonstall (R., Mass.)
James O. Eastland (D., Miss.)
Carl T. Curtis (R., Nebr.)
Styles Bridges (R., N.H.)
Everett Jordan (D., N.C.)
Strom Thurmond (D., S.C.)
Karl E. Mundt (R., S.Dak.)
A. Willis Robertson (D., Va.)

THE SENATORS named above are in hot water because they flunked tests established by the International Association of Machinists. In the last session of Congress, they voted "wrong" on such issues as labor legislation, minimum wages, jobless pay, depressed area aid, school construction, and health care.

Only one senator, Sen. Wayne Morse (D., Oreg.), had a perfect score. The senators who didn't pass face varying sorts of opposition this November. The Southerners are almost certain to retain their seats, while the Republicans in the North face tough contests, particularly Sen. Leverett Saltonstall (R., Mass.).

The loss of some of the men could affect metalworking. Senator Saltonstall, for example, has been active in defense procurement policies. In his advocacy of a more realistic understanding of the negotiated bid, some of his policies have been attacked by small business enthusiasts.

Sen. Gordon Allott (R., Colo.) is remembered for his attempts to institute reforms in the mining programs which aid such industries as lead and zinc. One of his pet themes has been the need to strike a historic ratio between domestic production and imports.

Another senator in the limelight for metalworking: Sen. John L. McClellan (D., Ark.). His labor investigating career continues to have repercussions in Congress. Midwestern and Western conservatives like Sen. Karl Mundt (R., S. Dak.) have been actively in favor of some tax reforms favored by industry.

● **TEAMSTERS GO IT ALONE**—The International Brotherhood of Teamsters, bossed by James R. Hoffa, has its special blacklist of legislators it doesn't want returned to Washington. Violently anti-Kennedy, because he is the "architect" of the Landrum-Griffin Labor Reform Bill, the 1.5-million-member union hasn't endorsed anyone for President.

The Teamsters are driving hardest to defeat about 50 members of the House who voted for the Landrum-Griffin Bill and who face the toughest contests in their respective districts. Such men as Reps. William H. Ayers (R., Ohio), Edgar W. Hiestand (R., Calif.), Thomas B. Curtis (R., Mo.), Charles A. Halleck (R., Ind.), and Noah M. Mason (R., Ill.) are on that blacklist. Representatives Hiestand and Curtis have been particularly interested in depreciation reform.

● **BIKEMAKERS GET RELIEF**—The Bicycle Manufacturers Association has won its case against Czechoslovakian bikes. The Tariff Commission ruling that Czech imports are injuring the domestic industry follows a Treasury Department report that the bike sales violated the Antidumping Act—they were being sold here at less than fair value. With the commission ruling, the case now returns to the secretary of treasury to formally find that a violation of the Antidumping Act has occurred. (The finding should be made within a week.) Then importers will be required to pay additional duties on the bikes. (Duties amount to the difference between the importer's purchase price and the foreign market value.)

● **RENEGOTIATION REPORTS SUBMITTED**—The Senate Armed Services Committee and a House Armed Services Subcommittee have turned in reports to Congress on the status of renegotiation. (Under the act, the Renegotiation Board reviews profits industry makes on government contracts.) The House subcommittee has recommended that renegotiation be made a permanent fixture, while the Senate committee passes the responsibility for recommendations to the Senate Finance Committee. Another report from the Joint Committee on International Revenue Taxation is due next March. In 1958 and 1959, industry made strong appeals to Congress to kill the act as unneeded and unwanted when there was no war emergency, but the administration and many congressmen argued that profits from defense contracts had to be overseen because of the magnitude of space contracts.

CIMTROL

Mr. E. J. Rivoira, manager of the new CIMTROL *Division*

CINCINNATI MILLING ANNOUNCES CIMTROL DIVISION

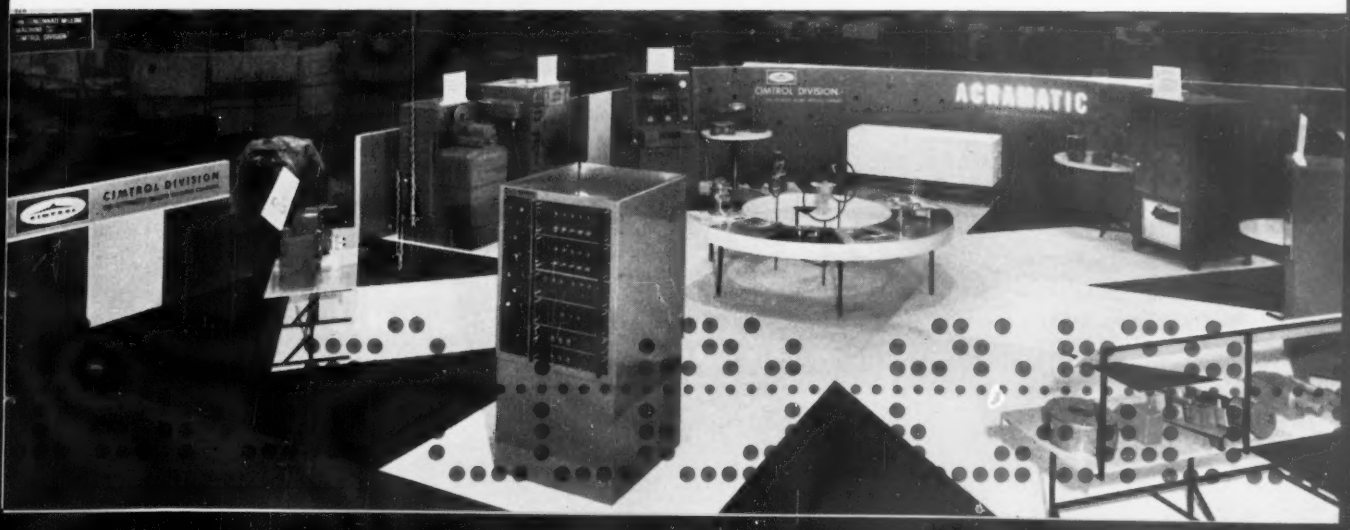
More than 30 years ago The Cincinnati Milling Machine Co. pioneered in the use of hydraulics for milling machine control. This basic method of control led to the development of many unique types of hydraulic, electronic and electro-hydraulic controls and systems—for milling, grinding, die sinking, broaching and special machines built by Cincinnati.

So important is this technology today that Cincinnati has established the CIMTROL Division (compounded from the words "Cincinnati Milling" and "control"). The only full line manufacturer of machine control systems, this new Division is responsible for engineering, manufacturing, marketing and servicing of controls for applications in products of original equipment builders.

The CIMTROL Division's exhibit at the Machine Tool Exposition presented three groups of products: ACRAMATIC Numerical Control; ACRATRACE tracing systems; ACRASIZE gaging systems. The Division also offers programming services for ACRAMATIC Numerical Control. Original equipment builders are invited to present their machine control problems to Cincinnati. CIMTROL Division engineers have the background to work out the best solution. **Cimtrol Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

CIMTROL **CINCINNATI®**

The most significant exhibit at the recent Machine Tool Exposition . . . CIMTROL *Division's display of controls for original equipment builders*



REVERSOL 1133

For the tough jobs other coolants can't handle...

REVERSOL 1133 is a soluble oil for water phase application as a coolant and lubricant for all metalworking operations—especially for tough, troublesome jobs. REVERSOL 1133 performs outstandingly on hard-to-machine steels, cast iron, stainless steel, Rene metal, missile metals and non-ferrous metals. This coolant yields remarkable results in faster, cooler machining; longer tool life; better finishes; closer tolerances and excellent dispersion of metallic silt. REVERSOL 1133 disperses easily in plain water, does not cause dermatitis and it prevents rust and will not stain ferrous or non-ferrous metals. Other features include: long service life and good cleaning properties.

Users who try it for difficult jobs, find it so economical and superior in performance that they change to REVERSOL 1133 for almost all applications, including drawing and stamping.

Write, wire or call for full details on REVERSOL 1133.

Photo Courtesy of Budd Co., Red Lion Plant

Operation: Machining a section of a pressure vessel
Material: 4340 carbon steel, approx.: 48" dia.
Speed: 97 rpm
Feed: .020
Depth-of-cut: .080

Tool: Carbide
Machine: Giddings & Lewis, Double Head (with side rail) Boring Mill
To achieve a 63 finish:
Speed: 100 rpm
Feed: .009, **Depth-of-cut:** .020

HARRY MILLER CORP. HAMICO 4th & BRISTOL STREETS PHILADELPHIA 40, PA

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DAvenport 4-4000 *Service Representatives in Principal Cities*

Ground Rules for Foreign Licensing

MORE AND MORE U. S. firms are counterattacking foreign competition with overseas licensing agreements. Each agreement calls for individual treatment, but all have a number of standard provisions that should be watched. The German American Chamber of Commerce offers this checklist:

1. Clear definition of the license and license object.
2. Designation of territory for which license is granted.
3. Exclusive or nonexclusive license.
4. Period of contract.
5. License fee (royalties). Basis for computation, whether based on volume, invoices, or net profit. Method of computation. Due date. Inspection of records and books. Currency in which payment is to be made.
6. Production and sales goal. Provision for contract cancellation if said goals have not been reached.
7. Quality control by licensor. Right of inspection.
8. Protection of licensor against change of patterns, designs, and models, or similar deviations. If a few trademarks exist, agreement as to which trademark should be used.
9. Patents, trademarks, and copyrights may require protection in country of the licensee.
10. Stipulation of unfair trade and restrictive covenant provisions and method of control. Preventive measures against breach of confidential information.
11. To what extent shall licensor be answerable to licensee for warranties given and representations made in connection with licensed formula or products.
12. Who is responsible to pursue (by legal methods) any infringement or breach of confidence by parties other than the parties to the contract.
13. Strikes and other acts beyond the control of the parties and their effect on the contract.
14. In the event that parties (as part of the consideration) must furnish raw materials or technical equipment, they should agree upon quantities, delivery time, price, and currency.
15. In case of assignment of technical personnel by licensor, stipulation of duration and payment, including the procurement of visas and working permits.
16. Cancellation of contract in case of war, breach of contract, insolvency, or loss of raw material sources.
17. If national laws differ, the parties shall agree on the law which governs and the jurisdiction to which they are to submit. Reasons of expediency, particularly in view of difference in law of procedure and evidence, arbitration seems to be the answer if and when a dispute arises. Arbitration associations in the U. S. (panels of experts with established rules of procedure) appear to be the best tribunal. Their awards are a safe basis for enforcement.
18. Consideration of double taxation laws and their application to license fees and royalties.

British Empire Notes

If cutbacks by British automakers continue, it will probably mean a big drop in sheet steel imports (500,000 tons in the first eight months of this year as opposed to 142,000 in the same period of 1959).

High level negotiations involving the development of large iron ore deposits in Swaziland are underway in London. The 6704 square mile British protectorate is in Southern Africa. Japanese interests have offered to buy all the ore produced over a period of ten years.

General Motors Holden Ltd., GM's Australian operation, chalked up its best month ever in September —13,900 cars came off its assembly line. Ford's Falcon was introduced in September. Chrysler's Valiant, Studebaker's Lark, and AMC's Rambler will soon be produced there.

GATT Meetings Underway

The fifth general conference of the General Agreement on Tariffs & Trade got underway in Geneva last month. Negotiations are expected to last nearly a year. The European Common Market, to which the U. S. exported $2.4 billion worth of goods in 1959, will bargain as a unit. In preparation for the meetings, the U. S. published a list of more than 2000 commodities to be considered for tariff concessions. Observers believe that a substantial lowering of world tariff rates will result from GATT negotiations.

Afghanistan 'Overlooked'

Afghanistan may be one of the smaller markets in the world which U. S. businessmen are overlooking. A U.S. trade mission to the Asian nation was surprised by "how little effort" is being made to sell there. A strong preference for U.S. tools was noted. They're considered good buys, even at higher prices. Afghanistan was also called an "area development dream."

J. T. THOMPSON, general manager of Raytheon Co.'s Distributor Products Div., devised the firm's Unimarket distributing system which serves the entire nation from one warehouse. Mr. Thompson points out Unimarket's advantages:

1. **Provides faster and more complete service to distributor customers.**
2. **Eliminates four field warehouses.**
3. **Eliminates taxes on duplicated inventory.**
4. **Eliminates back ordering and costs involved.**
5. **Encourages steady order flow.**
6. **Releases field sales personnel for more sales building activity.**

Centralizes Warehousing; Ships by Air

RAYTHEON CO., Waltham, Mass., **is cutting distribution costs at a rate of $361,000 a year and chopping delivery time by 92 per cent. How? A new distribution setup dubbed Unimarket.**

Raytheon is closing its four field warehouses: Atlanta is down, Los Angeles is being closed, and Portland, Oreg., and Chicago, will be shut soon after Jan. 1. The firm's 700 distributors will be supplied via air from one warehouse in Westwood, Mass.

Although air shipping costs will top surface freight charges by $124,000 a year, the rental, operating, tax, and inventory costs of the four warehouses being closed will cut Raytheon's annual outlays by $485,000. Net saving: $361,000. In addition, a saving of $2 million on duplicated inventories was possible at the start of the new program.

• **Prepunched cards showing the type and quantity of items are enclosed with each order. To reorder, the distributor merely gathers the cards and feeds them into transmitting machines at Raytheon district offices.**

The order is transmitted over leased wires to Westwood where the data cards are reproduced and multicopy packing slips and invoices are automatically created simultaneously.

The order is immediately filled from warehouse racks in the same building and the invoice is ready for billing when the merchandise is shipped 2 to 4 hours later. The merchandise (receiving tubes, diodes, transistors, and various other electronic components) is trucked the 10 mile jaunt to Boston's Logan International Airport. The goods, which have a high value content for their weight and volume, can be economically airlifted to almost any city in the country. Local and New England orders, however, are shipped by conventional over-the-road means.

• **Filling an order under the new system takes only one or two days against as many as 13 days formerly.**

Previously, the distributor placed his order with the district office which forwarded it to the regional warehouse to be filled and sent by ground transportation. But with 12 product lines including about 2300 items, the regional warehouse did not always have a complete inventory due to unpredicted movements of some products. In addition, the electronics industry has found that many slow moving items can be economically stocked only at the home warehouse. In Raytheon's case, the field warehouse could economically carry but 60 per cent of the company's products. So out of stock items were referred to the home warehouse for shipment.

• **Unimarket was devised to provide better service to customers and improve profitability. The aims are being fulfilled. Operating costs have been cut.**

In cities where Unimarket operations are in full swing, customer approval "has been good" with a "definite switch to Raytheon products occurring as distributors find

How Unimarket Works

it unnecessary to have several sources of electronic component supply for complete and speedy service."

All orders are serviced at the rate usually reserved for emergencies. Back ordering is virtually eliminated. Under the old system, 40 per cent of the items ordered from the field warehouse had to be backordered from the home warehouse, resulting in extra bookkeeping and invoice checking.

• The system is proving an aid to salesmen.

District managers and sales personnel once had to help customers take physical monthly inventories to determine order requirements (similar to supermarket and food merchandising). Now the prepunched cards assess the customer's need for him. So orders come in more frequently and automatically, daily or weekly, instead of monthly, helping to diminish peaks and valleys in Raytheon's business. Field sales personnel now have more time for productive sales promotion and for helping customers with business building plans. Continuous flow of merchandise means less inventory on customers' shelves, freeing their capital for other activities.

Another advantage is that Raytheon can use the card data to check its own inventory levels and aid in market research.

• Raytheon's ultimate objective: To have a private transmitter installed in the office of each of its major distributors.

That would speed and simplify the system even further. And that may not be as far off as it may seem at first glance, concludes the electronics maker.

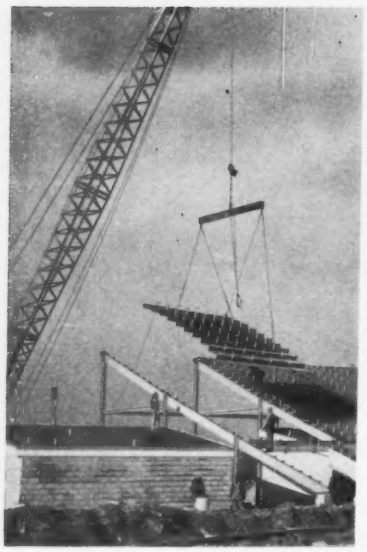
Have you entered **STEEL's Usership Idea Contest?**

See Pages 5 and 6.

Machines receive order information from prepunched cards over leased wires. Order is automatically translated into invoice and packing slip . . .

Order is immediately filled . . .

Merchandise is trucked to airport for one day delivery to almost any city in the country



Workmen transported 700 pieces of steel (1000 tons) 1½ miles during the relocation and expansion of Pennsylvania State University's 45,000 seat football stadium (right) at University Park, Pa. The job was handled by Pittsburgh-Des Moines Steel Co., Pittsburgh

Steel Stadium Move Scores Savings

IT'S CHEAPER to move a football stadium than build a new one.

Pittsburgh-Des Moines Steel Co. proved that when it put the finishing touches on Pennsylvania State University's relocated and expanded stadium facilities at University Park, Pa.

The Pittsburgh based company dismantled a 30,000 seat structure, moved it 1½ miles, and re-erected the stands within a completely new 15,000 seat addition.

• **Steel Succeeds**—The job was possible for one basic reason: The old stadium's all-steel construction.

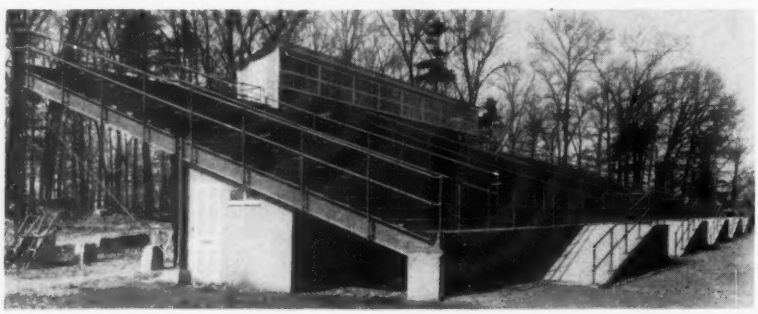
When the original stadium was erected in 1934, the school's planning board, after extensive study, decided to build an all-steel deck grandstand in lieu of an all-concrete or combined concrete and steel grandstand. Reason: Unitized construction offered permanence, mobility, and almost unlimited expansion. The Pittsburgh company handled the original job (20 rows, 2400 seats).

The new addition (involving 1250 tons of new steel) was fabricated and erected by the company. It relocated 700 pieces (1000 tons) of steel.

• **How Steel Scored** — Savings gained by relocating and expanding the facilities instead of constructing a completely new all-steel stadium are estimated at $300,000 by the Pittsburgh company.

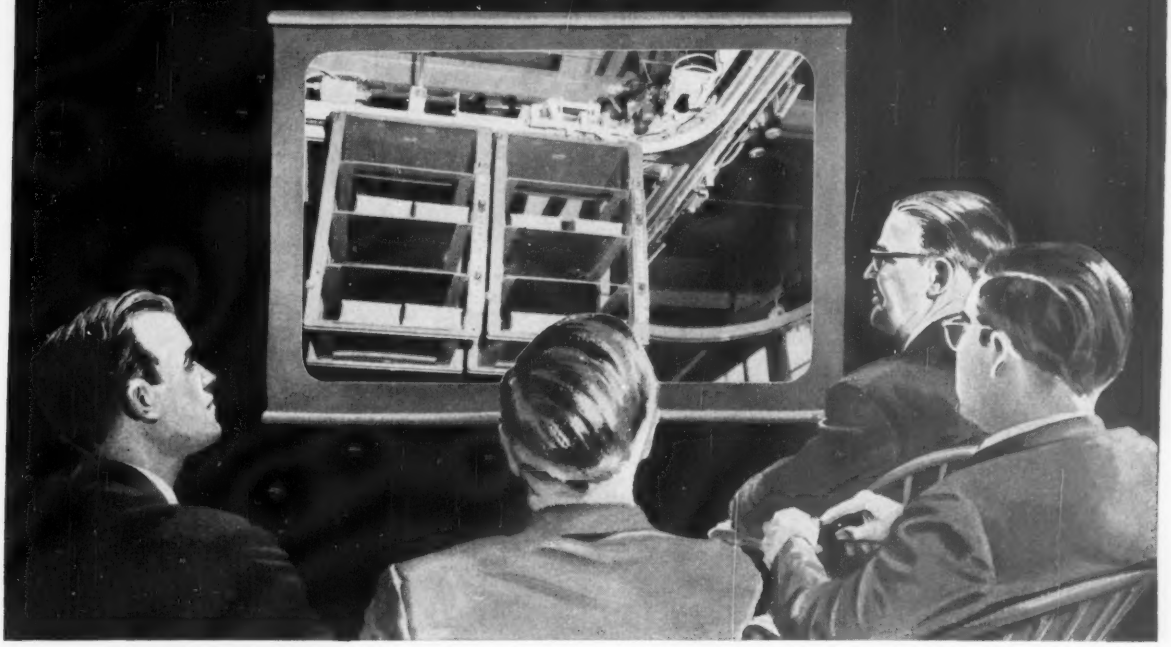
The new stadium is 70 rows deep, from goal post to goal post, with 126 ft in front of the pressbox 80 rows deep. There are 30 rows at one end of the horseshoe shaped stands.

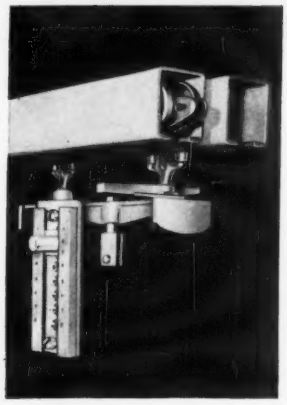
Formal dedication was Sept. 17, the day of Penn State's opening game against Boston University.



This was the first all-steel deck grandstand erected for Penn State in 1934

See the cost-saving advantages of an R-W "TWIN-TRAK" OVERHEAD AUTOMATIC DISPATCH SYSTEM demonstrated in your office!





An R-W "TWIN-TRAK" Overhead Automatic Dispatch System consists of one or more Power Track and as many Storage or Load Tracks as desired plus Switches, Carriers, Accessories and Power Equipment. "TWIN-TRAK" Systems are economical to install and maintain . . . easy to expand, alter or relocate as necessary.

The handling ot materials offers American industry its greatest cost-cutting frontier and reduced costs will be accomplished only with a "true" integrated materials handling system that coordinates all production functions on a plant wide basis. A new movie has just been produced that graphically demonstrates how R-W "TWIN-TRAK" Automatic Dispatch Systems meet this need. "TWIN-TRAK" is a completely automatic conveying system that selectively conveys parts, components and products throughout all production processes. Parts and components may be inventoried in overhead storage banks and then automatically selected and transported *where* they are needed—*when* they are needed. Write today to arrange for a showing of this film in your office.

Richards-Wilcox

MANUFACTURING COMPANY

MATERIALS HANDLING DIVISION

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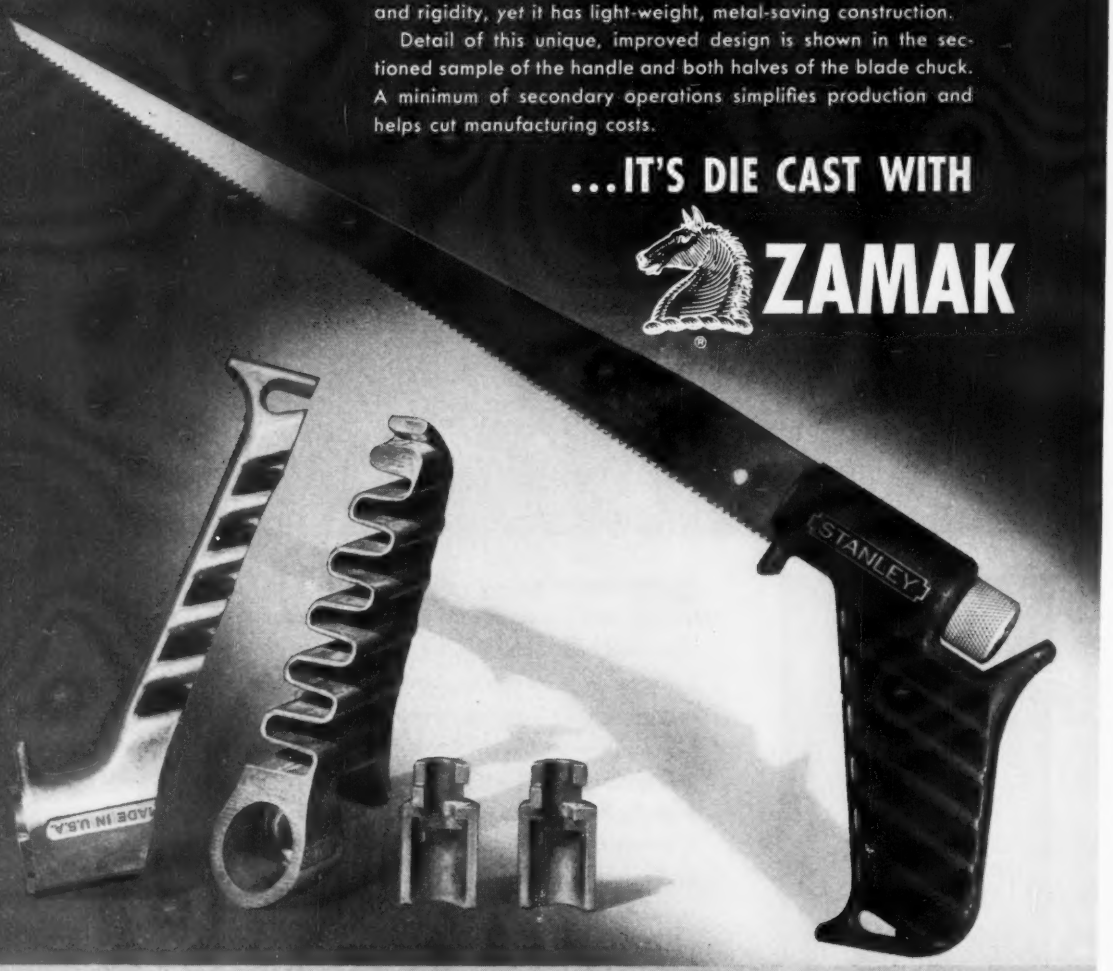
IT'S LIGHTER THAN YOU THINK!

ONE-PIECE CONSTRUCTION with MAN-SIZE GRIP and a MINIMUM OF METAL

The handle of this new keyhole saw, by Stanley Works, is designed for "heft" with a full, man-size grip, exceptional strength and rigidity, yet it has light-weight, metal-saving construction.

Detail of this unique, improved design is shown in the sectioned sample of the handle and both halves of the blade chuck. A minimum of secondary operations simplifies production and helps cut manufacturing costs.

...IT'S DIE CAST WITH ZAMAK



HORSE HEAD® SPECIAL ZINC AND HORSE HEAD ZAMAK ARE PRODUCED BY

THE NEW JERSEY ZINC COMPANY

DEVELOPERS OF THE ONLY STANDARD ZINC DIE CASTING ALLOYS IN USE TODAY

160 Front Street • New York 38, N. Y.

HORSE HEAD PRODUCTS®

Imports Hit Canada's Automakers

(UNITS)

	Total Vehicle Sales	Canada's Production	Exports	Imports
1963*	567,000	312,000	19,000	255,000
1959	515,000	349,000	19,000	166,000
1955	494,000	436,000	18,000	58,000
1950	445,000	356,000	34,000	89,000

Source: Canadian Automotive Parts Manufacturers' Association.
*Estimated by CAPMA.

DR. V. M. BLADEN comprises one man Royal Commission studying the dominion's problem

U.S. metalworkers shipped $243 million worth of vehicle parts to dominion last year. But their business will probably be curtailed as . . .

Canada Seeks Cure for Auto Ills

A ONE MAN Royal Commission opens public hearings Oct. 24 on the problems of the automobile industry in Canada. The results may affect U. S. manufacturers who last year exported $243 million worth of parts to Canada, 96 per cent of that country's total auto parts imports.

Aim of dominion interest groups is twofold: 1. To bring more work to Canadian part manufacturers. 2. To protect Canada's automotive industry from imports, particularly European cars.

Dr. V. M. Bladen, Canadian economic adviser, comprises the one man commission. He expects to recommend some solutions within six months. He says: "The condition of the automobile industry as a secondary industry has a fundamental effect on national policy. The effects can be appalling and frightening. The solution would be one which applies to all secondary industries."

His report will cover five areas: 1. A comparison of competitive conditions in the world-wide auto industry. 2. The relationships between Canadian manufacturers and their parent or subsidiary firms in all countries. 3. Problems of partmakers. 4. Ability of Canadian firms to market cars more economically. 5. Suggestions to boost car and part production, thus providing more jobs.

Cars Rank Third in Canada

Canada's automotive industry ranks third in hourly and salaried employment (49,000), says the Dominion Bureau of Statistics which lists pulp and paper mills first (62,776), and saw and planing mills second (51,849). Agriculture is the greatest revenue producer, but the auto industry still contributes 25 per cent of all net provincial tax revenue, about 25 per cent of excise tax income, and more than 10 per cent of Canada's sales tax revenue.

Major carbuilders are all subsidiaries of U. S. manufacturers and produce primarily standard size, Detroit designed cars with slight trim changes.

Two tariff regulations directly concern U. S. part suppliers. Put simply, one states that parts which are not made in Canada for economic reasons can enter dutyfree. The other ruling says in effect that if a certain percentage of parts in a car is made in Canada, the remaining parts needed to complete the assembly may be imported virtually dutyfree.

The content provision works on

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a sliding scale, but the average figure is about 60 per cent. It has dropped as low as 40 per cent in some cases. Result—all items like automatic transmissions, carburetors, major passenger car body stampings, and frames are imported from U. S. plants. About 60 per cent of U. S. shipments were duty-free in 1959.

Impact from Europe

Dominion auto sales have risen, but the increase has come from less expensive imported vehicles, mostly European. Of Canada's 154,000 passenger car imports last year, only 24,000 were made in the U. S. This ratio was reversed five years ago. In the last four years, the percentage of the Canadian sales market held by United Kingdom and European cars has vaulted from 8 to 25, says the *Windsor* (Ont.) *Star*.

Canada's export markets have slipped too. In 1946, the dominion exported 38.9 per cent of its output. By last year, the figure had dropped to 5.1 per cent. Unit export sales have been cut in half, Canadian Automotive Parts Manufacturers' Association (CAPMA) statistics show.

The United Automobile Workers figures it has lost 8000 of its 65,000 Canadian members since 1955. About 33,000 members work in the auto plants. The union says its most recent employment loss was Ford Motor Co.'s failure to call back 1700 of its 7800 workers in Ford of Canada's two plants at Oakville and Windsor, Ont., following the 1961 model change.

Why Industry Has Faltered

Tariff laws that haven't been corrected since 1935, plus the high unit costs inherent to Canadian carbuilders' limited volume, seem to lie at the base of the dominion's automotive plight. With one exception, Canada collects a 17.5 per cent duty on all vehicles entering its borders (United Kingdom cars are not charged duty).

Result—Low price British Hillmans, Sunbeams, Austins, and Vauxhalls are popular sellers.

Another tariff problem is that administrative decisions in post-World War II days have lowered the valuations on which duty is based. Volkswagen, for example, has had a customs valuation as low as $800, although its list price is double that amount.

Interest Groups Initiate Probe

Last year, three groups presented briefs to Canada's prime minister, John G. Diefenbaker. Mayors of the major automotive municipalities of Windsor, Oakville, Oshawa, and St. Catherines (all in Ontario), outlined economic losses suffered by their communities. The UAW pointed out employment losses and suggested changes in administering and interpreting present tariffs as well as the eventual development of a common market between the U. S. and Canada.

CAPMA is on record as favoring higher tariffs, 17.5 per cent on UK imports and 25 per cent on imports from other countries. It too seeks some sort of joint U. S.-Canadian market, although Donald S. Wood, executive vice president and manager, tells STEEL: "While a joint market is desirable, it will be difficult to attain because it would require private company as well as government co-operation. It probably would be particularly difficult for the U. S. because it would exclude other countries with which the U. S. has specific trade pacts."

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
9 Mo. Totals	4,957,167	4,336,725
October		507,527
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
Sept. 10	52,635	24,364
Sept. 17	85,879	62,716
Sept. 24	120,722	91,341
Oct. 1	134,118	105,720
Oct. 8	139,225†	118,793
Oct. 15	145,000*	133,430

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Look for These Changes

Canadians aren't prone to speculate on government probes, but the feeling is that tariff increases won't occur. Such hikes would require ratification by the 367 members of Canada's Parliament. It's doubtful that more than a handful would favor higher levies. Agricultural interests (a strong political factor) are flatly against it because they fear retaliation from countries like Germany, a major market for dominion wheat.

What is likely is that administrative regulations governing the valuation of goods for duty purposes will be altered and maximum provisions enforced. It's also expected that the "content scale" will be revised upward, perhaps to a point where 70 per cent of the parts in a car must be produced in Canada before other part imports can enter dutyfree. That automatically would create more jobs for Canadian partmakers. Higher duties also would cut down the price differential and Big Three manufacturers (who virtually control Canadian carbuilding) might push more of their manufacturing and assembly work across the border.

Other suggested solutions include the reduction of excise and sales taxes on Canadian built cars. Right now, both domestic built autos and imports are subject to a 7.5 per cent excise tax and an 11 per cent sales tax. Elimination or reduction of those taxes on cars built in Canada would make them more competitive costwise with compact imports.

And joint U. S.-Canadian market proposals are being taken seriously, say Canadian authorities. They'll be tough to work out, but don't discount the eventual possibility of some sort of joint market arrangement. George Romney, American Motors Corp.'s president, says he has several ideas to offer the Royal Commission if it wants them. AMC will start assembling Ramblers in its Brampton (Toronto, Ont.) plant in December. Mr. Romney suggests that might serve as a worldwide car export base for his company.

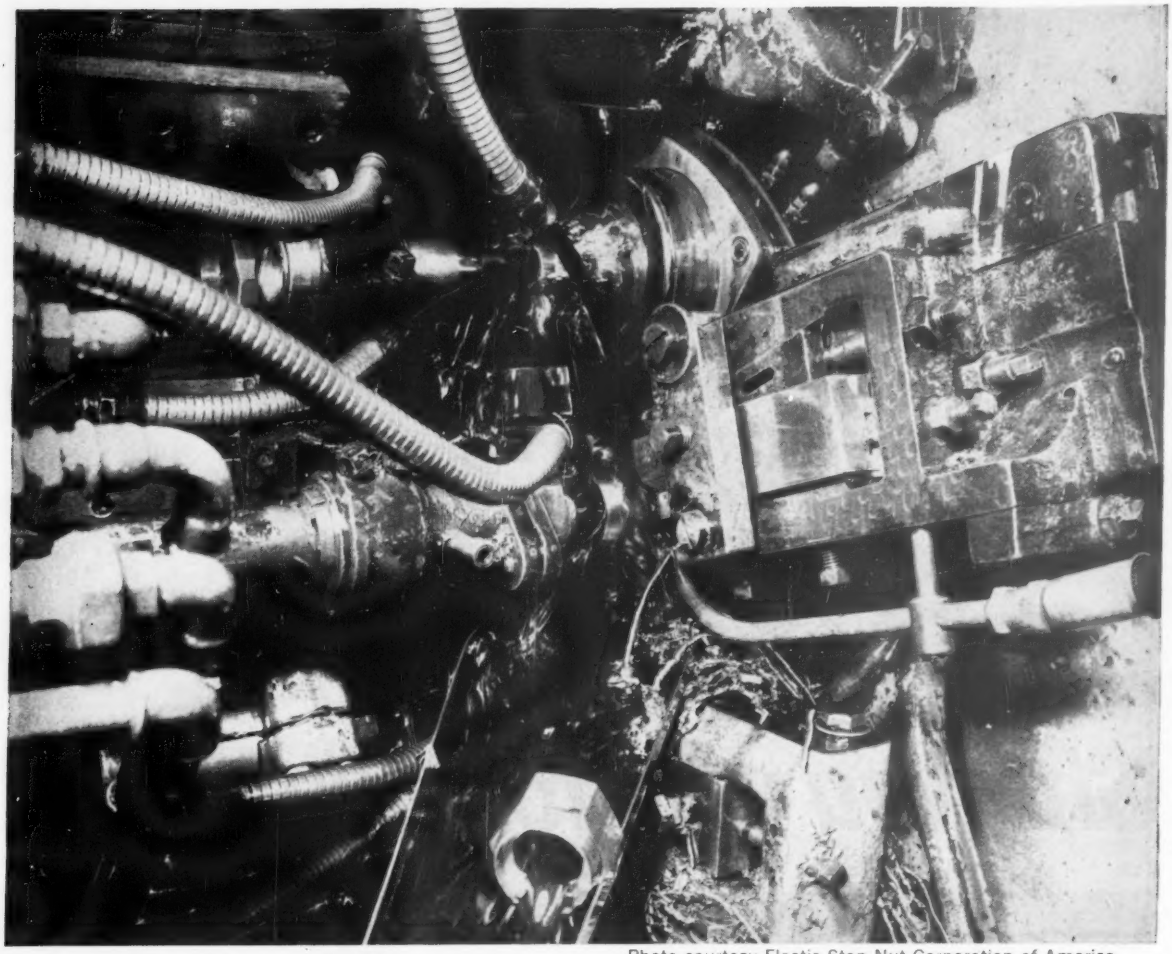

Photo courtesy Elastic Stop Nut Corporation of America

Nuts . . . ESNA makes millions of them from Aristoloy Electric Furnace Steel

Steel for self-locking hex nuts must be uniform in structure, easy to machine and free from internal and external defects. Elastic Stop Nut Corporation of America insists on these qualities . . . and gets them with Aristoloy cold finished bars.

Aristoloy Electric Furnace Steels, carefully controlled from melt shop to finishing operations, meet specifications for this and other applications requiring steel of uniform quality.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city . . . or write for NEW PRODUCTS & FACILITIES CATALOG.

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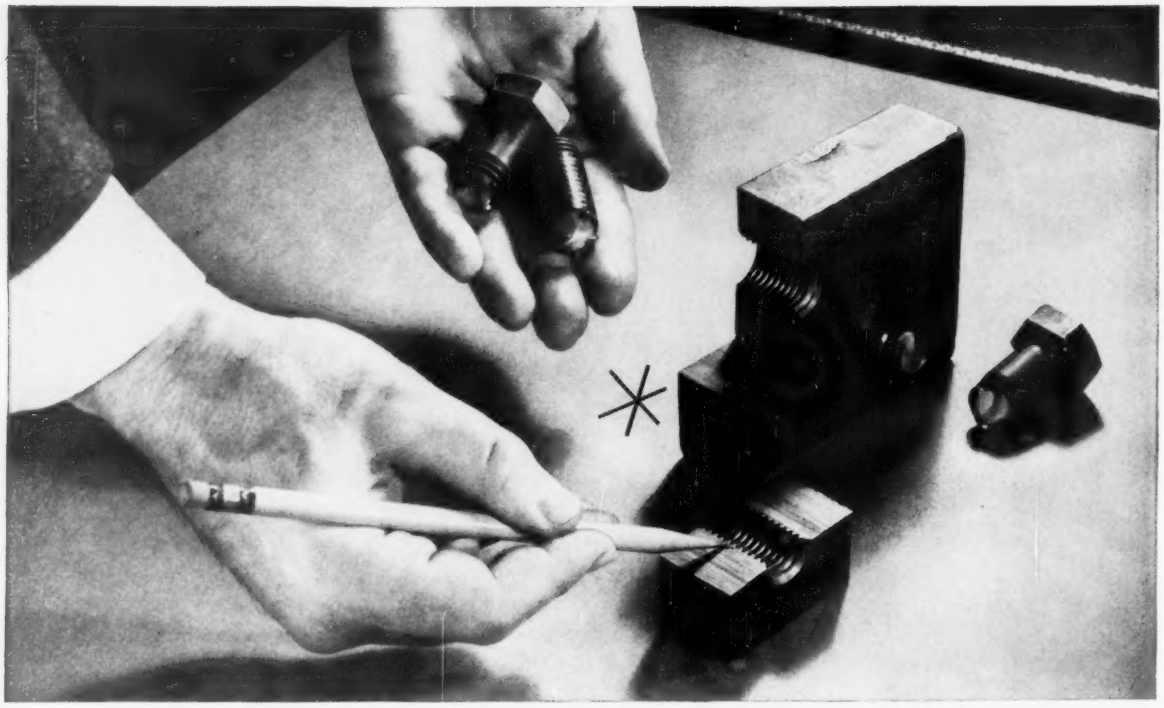


Showed way to save $7800

RB&W fastener survey of refrigeration unit suggested that hex screws be substituted for studs ... and castings be tapped with less costly clearance fit.

When there are no special design requirements or space clearance conditions, using studs of 1-inch diameter and smaller often penalizes the user needlessly. First, in direct costs, since the more economical *hex screws* will do the job. Second, in production costs, since studs require holes tapped with an expensive *interference* thread fit.

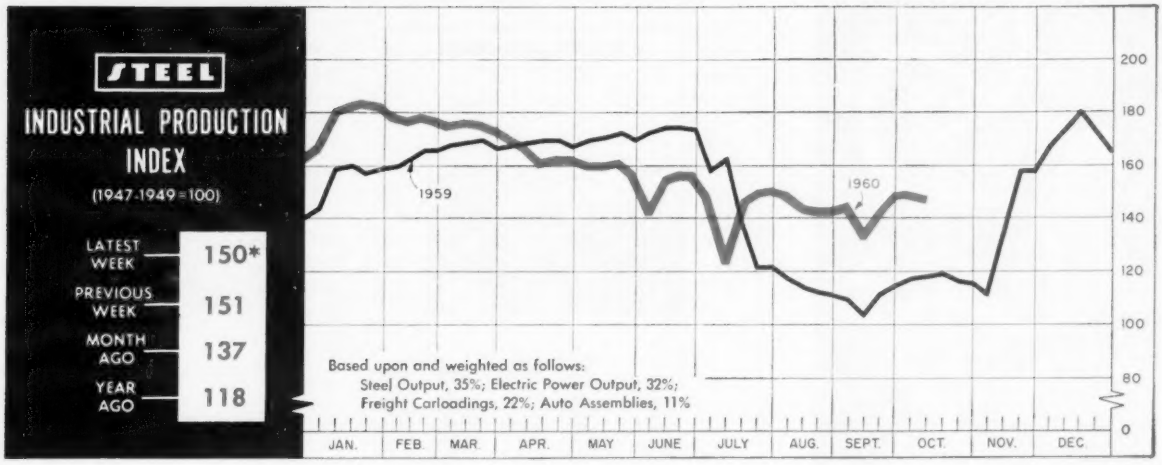
The RB&W Man pointed this out when his survey revealed over 250 stud fastenings per refrigeration unit. For this application, 250 hex screws cost $8.45 . . . for a saving of better than $22 over the studs and nuts. Annually this would total to $7800 . . . *clear profit.* And on top of this, reduced tapping costs, too.

Want to get the most from *your* fastener dollars? Ask for an RB&W man to make a survey. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W
116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.

* *Specifying studs for fear that hex screws might damage castings during disassemblies is based on a groundless fear. Hex screws in threaded holes with clearance fit can be reused repeatedly without damaging the casting. In the test casting shown above, the hex screws were first tightened and removed 50 times—then torqued to breaking point. Cutaway section showed casting threads were still perfect, with no sign of stripping.*



*Week ended Oct. 8.

More Inventory Liquidation Ahead

INVENTORY LIQUIDATION has come a long way since last spring, but it still has some way to go. And the general economy is not likely to get much healthier, especially in the durable goods industries, until purchasers have a change of heart.

• **Buyers Still Cutting**—Purchasing agents think further reductions are on the way. In the September report of the Business Survey Committee of the National Association of Purchasing Agents, the best that could be said about stock levels was that the cutback is slowing down. Thirty-seven per cent of the reporting members said stocks were lower than they were a month before compared with 41 per cent in August. Only 13 per cent said inventories were higher, matching the August count.

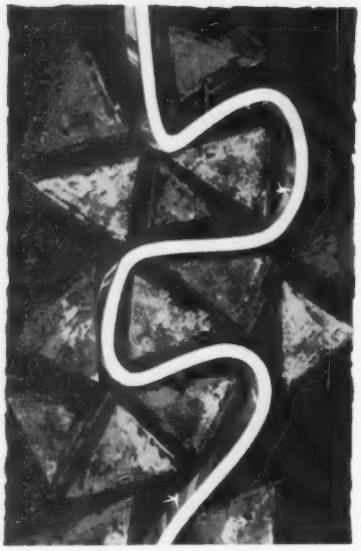
This is the sixth consecutive report in which the balance was on the down side—a fairly long period by historical standards. But the purchasing agents evidently think conditions warrant further trimming. Thirty-eight per cent still think stocks are too high, and only 4 per cent think they're too low. Unless orders pick up, it could be some time before buyers attain their "ideal" inventory position. And their own testimony argues against any immediate improvement. New orders in September were better for only 29 per cent of the respondents compared with 35 per cent in August.

• **Statistical Proof** — Government statistics indicate there is still some room for inventory cutting. Reports of purchasing agents to the contrary, total manufacturers' inventories did not show any downtrend until July. By stages of fabrication, the only sign of weakness has been in purchased materials, which leveled off from March through May, followed by a steady but small decline through August, the latest month of record. Goods in process dipped in July but advanced again in August. Although auto and appliance dealers have been working

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,556[1]	1,522	368
Electric Power Distributed (million kw-hr)	13,800[1]	13,779	13,086
Bituminous Coal Output (1000 tons)	8,240[1]	8,105	7,611
Crude Oil Production (daily avg—1000 bbl)	6,875[1]	6,849	6,812
Construction Volume (*ENR*—millions)	$602.8	$409.5	$243.4
Auto, Truck Output, U. S., Canada (*Ward's*)	163,288[1]	161,968	148,239
TRADE			
Freight Carloadings (1000 Cars)	620[1]	632	559
Intercity Truck Tonnage (changes from year ago)	−1.0%	−2.1%	+8.0%
Business Failures (Dun & Bradstreet)	304	321	224
Currency in Circulation (millions)[3]	$32,046	$32,004	$31,933
Dept. Store Sales (changes from year ago)[3]	+4%	+2%	−2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$29,004	$27,530	$26,086
Federal Gross Debt (billions)	$288.1	$288.9	$288.0
Bond Volume, NYSE (millions)	$22.2	$28.1	$27.5
Stocks Sales, NYSE (thousands of shares)	12,209	16,853	11,863
Loans and Investments (billions)[4]	$106.2	$106.8	$103.7
U. S. Govt. Obligations Held (billions)[4]	$27.8	$28.0	$28.1
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	227.9	227.8	225.3
All Commodities[7]	119.5	119.5	119.2
Commodities Other than Farm & Foods[7]	128.1	128.2	128.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.



BRMCO
SPECIAL ALLOYS
slash
material
costs

BRMCO-developed aluminum, brass, and bronze alloys often replace higher priced strip metals . . . cut material costs, while promoting longer tool life, fewer rejects, increased production.

A pressure gauge manufacturer, for example, cut gear segment material costs 25% by changing to a BRMCO formulated strip. The manufacturer had been using Grade A phosphor bronze; then tried leaded phosphor bronze in an effort to improve machinability, increase production. When the leaded phosphor bronze failed to do the job, BRMCO was called in and quickly developed a special bronze alloy. Labeled "LED-O-LOY," this BRMCO Strip provides this manufacturer with greater workability, machinability, and wear resistance—while reducing his material costs 25%.

BRMCO special alloys may solve your production and cost-reduction problems, too. Write or call today, outlining your requirements. If you phone, call EDison 7-4434 (Bridgeport — collect) and ask for Larry Hayden, field service department.

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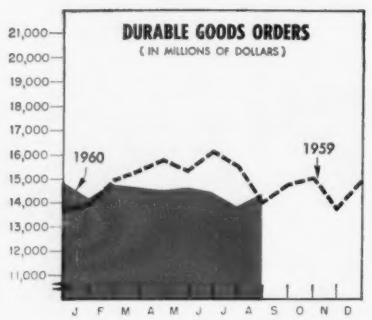
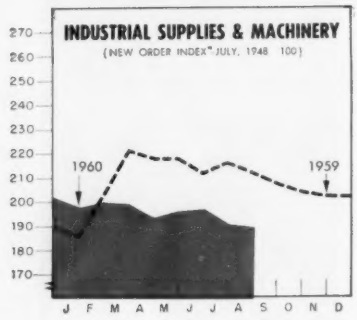
THE BUSINESS TREND





	New Orders* 1960	New Orders* 1959	Sales* 1960	Sales* 1959
Jan.	14,190	13,900	15,450	13,541
Feb.	14,800	14,918	15,670	13,870
Mar.	14,640	15,323	15,170	14,400
Apr.	14,470	15,796	15,000	15,166
May	14,680	15,241	15,060	15,515
June	14,340	16,133	14,880	15,771
July	13,840	15,493	14,730	15,384
Aug.	14,300†	13,974	14,420†	14,008
Sept.	.....	14,747	.....	14,113
Oct.	.....	15,099	.....	14,047
Nov.	.....	13,721	.....	13,479
Dec.	.....	14,770	.....	15,010

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.

	1960	1959	1958	1957
Jan.	198	186	163	221
Feb.	200	202	157	219
Mar.	199	221	149	210
Apr.	194	218	148	203
May	196	218	152	199
June	197	212	164	199
July	191	216	170	197
Aug.	190	212	172	197
Sept.	...	207	178	203
Oct.	...	204	187	192
Nov.	...	202	189	180
Dec.	...	202	190	167

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

Charts copyright, 1960, STEEL.

away at old model inventories, stocks of finished goods were still climbing in August.

Measured as a component of the gross national product, the change in business inventories has come down from an annual rate of plus $11.4 billion in the first quarter to plus $5.3 billion in the second, to close to zero in the third. Many of the members of STEEL's Panel of Economic Consultants told the editors that they expect manufacturers to overcorrect inventories (as they have in each of the three postwar recessions) to the tune of minus $2 billion by the first quarter of 1961 before an uptrend shapes up. (For the panel's latest report, see STEEL, Oct. 3, pp. 39-41.)

Sees End of Adjustment

Martin R. Gainsbrugh, chief economist for the National Industrial Conference Board, told a Cleveland audience last week that he believes the worst will be over by the end of this year.

He cites three schools of thought on current economic trends:

1. The "leading indicator watchers" contend that a recession started several months ago and that it is still in progress.

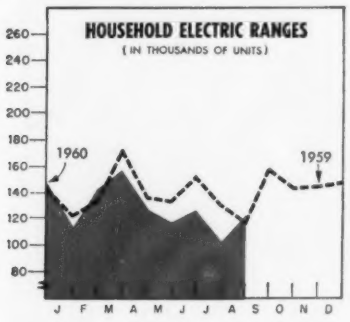
2. The concurrent indicator watchers say it began in August or September and still has its full course to run.

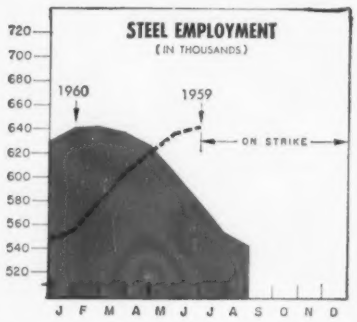
3. Members of the third school (to which he belongs) feel we have experienced a series of dislocations which has resulted in a temporary loss of momentum, especially in durable goods (see graph and table above), but has left the economy operating at a high level.

He points out that total industrial production has declined less than 1 per cent below the 1959 high point despite drops of 5.5 per cent in total durables production and 29.5 per cent in primary metals output. Nondurables production has increased 1.8 per cent over the 1959 peak.

A more convincing argument is the net gain in gross national product when you deduct the effects of inventory change. Mr. Gainsbrugh points out that GNP on that basis advanced from an annual rate of $489.9 billion in the first quarter to $499.7 billion in the second. He estimates a further advance to $503 billion in the third (on the basis of no change in inventories).

He also points to the record high rate of employment. (At 67,767,000 last month, it was 1,420,000 higher than it was a year ago.) Since Au-





	Total Factory Sales—Units		
	1960	1959	1958
Jan.	113,500	120,800	109,000
Feb.	143,200	134,600	108,700
Mar.	156,400	172,600	117,900
Apr.	127,000	136,100	95,600
May	117,600	133,400	96,000
June	126,200	151,400	116,800
July	102,100	129,200	98,500
Aug.	122,400	116,600	81,400
Sept.	.....	157,200	122,300
Oct.	.....	143,400	135,100
Nov.	.....	144,000	129,100
Dec.	.....	147,500	144,000
Totals	.....	1,686,800	1,354,400

National Electrical Mfrs. Assn.

	Employment in Thousands		Payroll In Millions	
	1960	1959	1960	1959
Jan.	641	555	$398.8	$335.2
Feb.	643	580	381.4	333.9
Mar.	637	604	398.8	385.4
Apr.	626	621	357.2	385.5
May	604	635	339.8	396.9
June	580	641	316.0	398.2
July	554	n.a.	287.0	n.a.
Aug.	543	n.a.	300.3	n.a.
Sept.	...	n.a.	....	n.a.
Oct.	...	n.a.	....	n.a.
Nov.	...	n.a.	....	n.a.
Dec.	...	548	....	400.3

n.a.=not available because of strike.
American Iron & Steel Institute.

gust, 1957, at the peak of the previous economic cycle, the labor force has increased by 3.1 million persons. Yet unemployment has gone up only 1.2 million.

He declares that the disappointment in 1960 can be traced to four factors:

1. Early estimates were excessive because they assumed a continuation of the growth pattern in January and February.

2. The steel strike caused many dislocations.

3. Defense spending declined in the second quarter.

4. The government went from a $13 billion deficit to a balanced budget during the year.

Index Loses Steam

On the basis of preliminary figures, it looks like STEEL's industrial production index has lost the momentum that gave promise of a normal seasonal uptrend following Labor Day. At an estimated 150 per cent of the 1947-49 average for the week ended Oct. 8, the trend line dipped for the first time in four weeks. It followed a downward revision of 2 points for the previous week's reading when output of electric power fell below forecasts.

The outlook for further increases is not good. Autos have been the biggest factor in the September climb, and you can look for cutbacks in that industry at any moment. The feeling in Detroit is that published schedules are unrealistic. If producers stuck to them, they would push out more than 1.9 million units this quarter, or a hair under the all-time record for the quarter set in 1955. However, inventories of 1960-61 models stood at 865,000 units at the beginning of this month, not counting 125,000 imports.

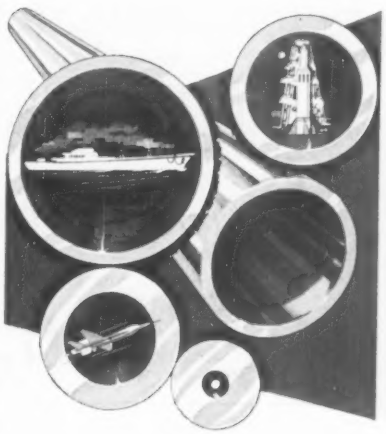
Detroit observers declare that auto dealers would have to sell something above 600,000 new cars a month to sustain anywhere near the proposed output. The monthly average so far in '60: Only 509,000.

With automotive cutbacks imminent, the outlook for further increases in steel production is dimmed. While railroad freight carloadings may edge up for a while, they face an early setback when the Great Lakes ore fleet halts operations. (See STEEL, Oct. 10, p. 83.) During the rest of the fourth quarter, the only component of the index which should be moving upward significantly is electric power production, and it has been disappointing in the last couple of weeks.

THE INSIDE STORY OF TMI TUBING

● Quality is a lot more than skin deep in TMI cold drawn tubing . . . within the walls themselves *and* on the inside surfaces! These are the QUALITY areas most difficult to control . . . and the keys to the quality reputation of the men and machines of TMI.

The "inside story" of our success is the unique method procedures by which we accomplish so much in the production of quality tubing . . . in smooth, clean, inside surfaces, in absolute adherence to wall thickness specifications.



● TMI knows that the future waits for no man and that business goes where business is ready to accept the future's most demanding specifications. We are always alert to new methods, new procedures, new ways to make tubing better . . . better for *you* and better for us. Sizes: .050″ to 1.250″ O.D., with tolerances as close as .0005″ when required . . . in stainless steels, in exotic metals, in special alloys. We are as close as your telephone (*NORRISTOWN—BRoadway 9-7700*) . . . distribution nationwide and in Canada . . . with delivery and quality as promised always.

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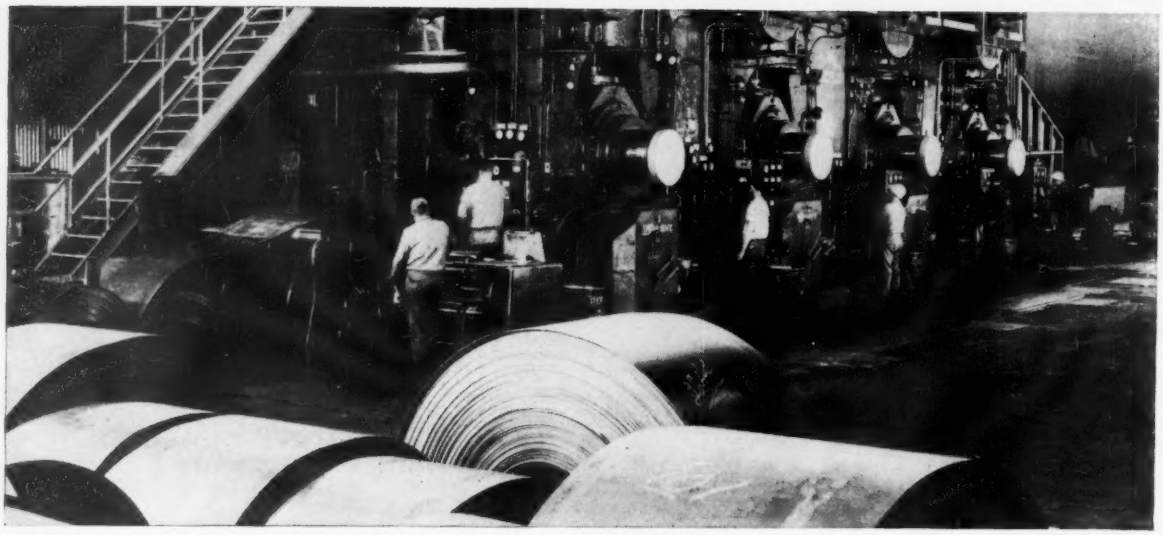

Four stand cold strip mill of Granite City Steel Company, Illinois. One of the most powerful tandem cold reduction mills in the U.S.

Heppenstall Sleeve #1727

was in the mill

89 times... and rolled

921,863 tons

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Not every sleeve can roll a record... regardless of who makes it. But Heppenstall and Midvale-Heppenstall Sleeves have helped raise some *averages*, too, and that's what we'd like to do for *you*.

Heppenstall and Midvale-Heppenstall Back-Up Roll Sleeves reflect the long experience of two pioneer sleeve producers. Each sleeve's working surface is *tempered to meet your exact hardness specification.*

These mandrell-forged sleeves—made from highest quality alloy steel—are worked thoroughly under modern hydraulic presses to produce a finished product having both maximum density and grain refinement. They offer you exactness of fit and greater resistance to cracking and spalling during high-speed rolling.

Heppenstall and Midvale-Heppenstall also produce forged arbors... and have facilities to grind both arbors and sleeves for perfect shrink-fitting.

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Brooks & Perkins president

ROBERT W. KERR
Fluor Products president

EDWARD P. SANDBACH
Mackintosh-Hemphill mfg.

WILLIAM M. ADLER
National Alloy sales mgr.

Edward L. Ladd succeeds **E. Howard Perkins**, retired, as president of **Brooks & Perkins Inc.**, Detroit. Mr. Perkins, cofounder of the firm, remains as chairman. Mr. Ladd is a former president of United Aircraft Products Inc.

Robert W. Kerr, who recently resigned as president of Fairbanks, Morse & Co., was elected president of **Fluor Products Co.**, Los Angeles, division of Fluor Corp. Ltd. He was also elected vice president of Fluor Corp.

Donald R. Piatt joined **Veeder-Root Inc.**, Hartford, Conn., as vice president-engineering and research. He was manager of engineering for Time Equipment Div., International Business Machines Corp.

William F. Wilson was named general manager of Wellman Engineering Co.'s **Anker-Holth Div.** at Port Huron, Mich. He was with Engleside Tool & Mfg. Co. Previously he was executive vice president of Gear Grinding Machine Co.

Charles P. Harbaugh was made product line manager, machine tools sales, Electronics Div., **ACF Industries Inc.**, at Riverdale, Md. He was with Cosa Corp.

William D. Miller was elected executive vice president, **Consolidated Aluminum Corp.**, Jackson, Tenn. He joined the firm last March as vice president. He was vice president of Continental Copper & Steel Industries Inc., New York.

Edward P. Sandbach was appointed manager of manufacturing, **Mackintosh-Hemphill Div.**, E. W. Bliss Co., in charge of manufacturing operations at Pittsburgh and Midland, Pa., plants. He was chief metallurgist for the division.

W. Frank Lowell was elected president, **Saco-Lowell Shops**, Boston, to succeed **Thomas J. Ault** who resigned last July. Mr. Lowell was senior vice president.

Edward C. Spal Sr., sales manager of **Associated Spring Corp.'s** Gibson Div., Mattoon, Ill., was appointed to succeed **Charles M. Holnback** as general manager of the firm's Seaboard Pacific Div., Gardena, Calif. **Troy L. Sorensen** replaces Mr. Spal.

James F. Orr Jr. joined **Servo Corp. of America**, Hicksville, N. Y., as manager of product sales.

William P. Carlin was made director of economics of **Republic Steel Corp.**, Cleveland. He was assistant manager, Sales Dept., Commercial Research Div. He will be attached for administrative purposes to the Research & Planning Dept.

E. F. Greiwe was named manager of **Allis-Chalmers Mfg. Co.'s** newly consolidated Centrifugal Pump & Compressor Dept. at West Allis, Wis. Mr. Greiwe, former manager of the Norwood, Ohio, Works, Centrifugal Pump Dept., is succeeded by **R. J. Dineen. C. F. Codrington** was made sales manager; **H. L. Ross** manager of engineering for the newly consolidated department.

William M. Adler was named sales manager, **National Alloy Div.**, Blaw-Knox Co., Pittsburgh. He was Eastern district manager for the division, and also represented the Power Piping Div.

Frank Chudoba was appointed machine tool co-ordinator of **Goss Co.**, Chicago, division of Miehle-Goss-Dexter Inc.

Jack D. Rice, recently made director of procurement of **Koppers Co. Inc.**, Pittsburgh, was elected a vice president.

Harry L. Hildebrand was named manager of process and design engineering, **Taylor Fiber Co.**, Norristown, Pa. He is succeeded as manager of the Fabricating Div. by **John G. Musselman Jr.**

T. J. Pohl was made sales manager, Insulation Div., **M. H. Detrick Co.**, Chicago.

American Engineering Co., Philadelphia, subsidiary of United Industrial Corp., reorganized its Marine & Hydraulic Div. into separate divisions. **LeRoy J. Stoutenburg** joined American Engineering as sales manager, Hydraulic Div. He was with Rivett Lathe & Grinder. **Vernon Olson** continues as sales manager, Marine Div.

A. Earl Lee was appointed vice president in charge of the new Marketing Div. of **J. I. Case Co.**, Racine, Wis. He was marketing co-ordinator.

Michael L. Zwerin, former secre-

EINAR K. JOHANSEN

ANTHONY L. BARBARO

Clearing engineering and purchasing posts

MILLAN SHEVCHIK

E. C. ELLISON

Overly Mfg. production positions

tary, was elected president of **Capitol Steel Corp.**, New York.

Einar K. Johansen was appointed vice president-engineering, **Clearing Div.**, Chicago, U. S. Industries Inc. **Anthony L. Barbaro** was appointed director of purchases.

Walker G. Dollmeyer, former vice president of Solar Aircraft Co., was named to the newly created post of vice president-operations for the Stratford, Conn., plant of **Lycoming Div.**, Avco Corp.

Robert J. Burns was made general manager, Metal Products Div., **Goodyear Tire & Rubber Co.**, Akron. He succeeds **H. J. Lafaye**, retired.

Dudley G. Seay, executive vice president, was elected president of **Basic Products Corp.**, Milwaukee. **Anthony von Wening**, chairman, continues as chief executive officer. Mr. von Wening has held the position of president and chairman since 1957.

Millan Shevchik joined **Overly Mfg. Co.**, Greensburg, Pa., as director of operations, responsible for production at the Greensburg plant. He was works manager of H. K. Porter Company Inc.'s Disston Div. plant at Danville, Va. **E. C. Ellison** was appointed assistant to the vice president-production and engineering, and will supervise production at Overly's new plant in St. Louis.

John E. Krickl was made Western district sales manager for **Lindberg Engineering Co.** He is at the West Coast plant in Downey, Calif.

Anthony E. Von Alt was named superintendent of the Blast Furnace Dept. at **Republic Steel Corp.'s** Chicago district steel plant. He succeeds **Paul D. Johnson**, retired. **John J. Barrett** was made assistant superintendent, succeeding Mr. Von Alt.

Mark Taifer was appointed manufacturing manager, Coated Abrasives Div., **Armour Alliance Industries**, Alliance, Ohio. He was director of research and technical sales director for Abrasives Products Inc.

Richard D. Sevick, director of research and development of abrasive cutting wheels for **Allison-Campbell Div.**, Bridgeport, Conn., American Chain & Cable Co. Inc., assumes added duties of supervision of abrasive cutting machine development, replacing **Harry G. Robinson**, retired chief engineer of Campbell machine design.

Wayne Rising and **Richard C. Simpson**, former vice presidents, were named senior vice presidents of **Ducommun Metals & Supply Co.**, Los Angeles. **Russell Rising**, vice president, was named general manager-Western operations.

W. J. Vonah was appointed general sales manager, **Erie Forge & Steel Corp.**, Erie, Pa. He formerly directed sales for the New York-New England territory.

North American Refractories Co. appointed **George E. Johnson Jr.**

DUDLEY G. SEAY

Basic Products president

ANTHONY E. VON ALT

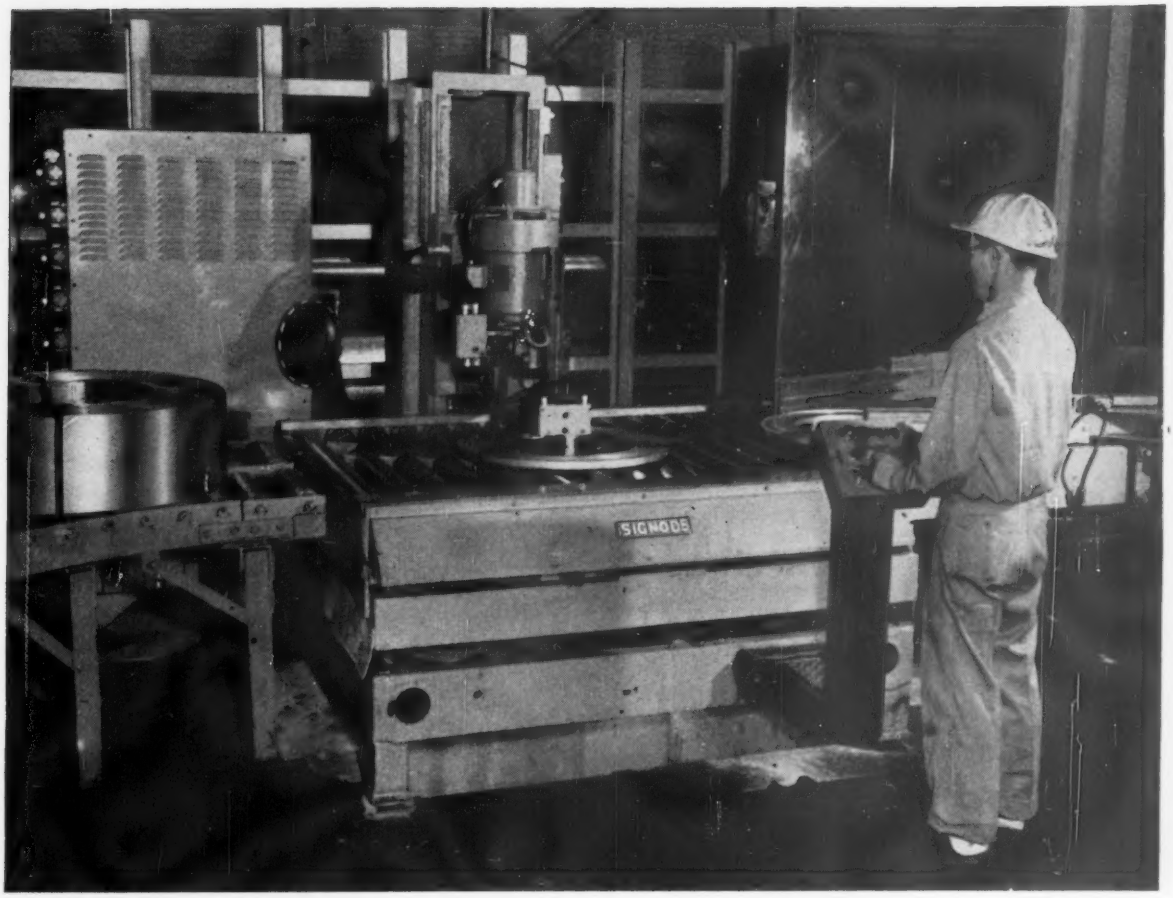
Republic supt.-blast furnaces

MARK TAIFER

Armour Alliance production post

W. J. VONAH

Erie Forge gen. sales mgr.



Fast new Signode M20 strip coil strapping machine

Push a button, and this Signode M20 feeds the strapping through the eye of the coil and tensions, seals, and severs it—all in a few seconds. Push another button, and the machine rotates the coil for the next strap. The operator can apply two, three, four or more straps per coil.

Mixed coil sizes are strapped at volume production speeds. The machine automatically adjusts for any coil height (width of strip) between ½ inch and 14 inches, and for any coil O.D. from 19 inches to 50 inches. Each strap is applied with the same pre-set tension. As on all M20's, tension is easy to adjust if desired.

The machine puts the seal on the upper face of the coil. There are several advantages to this: working parts last longer because they are subject to minimum dirt and grit, accessibility for servicing is excellent, the seal is in plain sight.

A wide range of M20's is available on a deposit or annual rental basis, for strapping products of almost any shape and size up to six feet in diameter, using strapping from ⅜ to ¾ inches wide.

Write for details, including free booklet, "Signode M20 Series Standard Power Strapping Machines."

SIGNODE

First in steel strapping

SIGNODE STEEL STRAPPING CO.

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Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto.

WALLACE E. ANDERSON
Cosa v. p.-gen. sales mgr.

JAMES K. MYBURG
Easton Metal Powder sales

W. F. ZUNKER
Firetube sales manager

LEON MOLLICK
B-L-H div. eng. mgr.

MARTIN N. LINDSAY
added duties at Crucible

JAMES L. MURPHY
Westates Steel v. p.

laboratory manager of its Curwensville (Pa.) Research Center.

Leon Mollick was made manager of engineering, Industrial Equipment Div., Philadelphia, for **Baldwin-Lima-Hamilton Corp.** For ten years, he was chief stress analyst for the division.

Martin N. Lindsay was made sales manager, coke and pig iron, for **Crucible Steel Co. of America**, Pittsburgh. His new duties supplement his activities in Crucible's Raw Materials Section which works closely with purchasing and operations in the control of specifications and policies in securing starting materials for steelmaking.

Martin J. Butler Jr. was made manager of marketing services for **Imperial Brass Mfg. Co.**, Niles, Ill. He was with Diversey Corp.

R. J. Bunch was made manager of **Ingersoll - Rand Co.'s** Centrifugal Pump Div., New York. He was manager of the Condenser Dept.

James L. Murphy was appointed vice president-general manager of **Westates Steel Corp.**, San Jose, Calif., subsidiary of Caspers' Tin Plate Co. He replaces **LeRoy K. Hitchings**, temporarily named general manager following the recent resignation of **F. Graham Judge**. Mr. Murphy was with Pittsburgh-Des Moines Steel Co. Mr. Hitchings, retired vice president and treasurer of the parent firm, has been retained by Westates in an advisory capacity as financial and credit consultant.

Walter J. Nock was appointed vice president in charge of the Mexican Div. of **American Smelting & Refining Co.** He was general manager, Mexican Mining Dept.

Loren K. Grimes fills the new post of product manager, **Bostitch Inc.**, East Greenwich, R. I.

Daniel J. Gorman was elected president of **Federal Lime & Stone Co.**, and **South Euclid Concrete Co.**, both of Cleveland.

Wallace E. Anderson was appointed vice president and general sales manager for all imported precision and automatic machine tools at **Cosa Corp.**, New York. He was general sales manager, Brown & Sharpe Mfg. Co., and for the last three years was vice president-general manager of its Industrial Products Div.

James K. Myburg was appointed general sales manager, **Easton Metal Powder Co.**, Easton, Pa., division of American Mannex Corp. He was sales manager for Republic Steel Corp.'s Metal Powder Div.

W. F. Zunker was named sales manager, **Firetube Div.**, Cleaver-Brooks Co., Milwaukee. **John J. Nash** was made assistant sales manager. All Firetube boiler sales are now consolidated under Mr. Zunker. Sales had been divided into industrial and commercial sections. A new Sales-Engineering Dept. will be headed by **Paul Buday.**

William A. Suiter and **Rhoda M. Stewart** were named vice presidents, **Marbon Chemical Div.**, Washington, W. Va., Borg-Warner Corp. Mr. Suiter has served as Cycolac resin sales manager since joining Marbon in 1958. Miss Stewart served as director of purchases, and earlier this year the Traffic Dept. was added to her duties. She also directs the Personnel Dept.

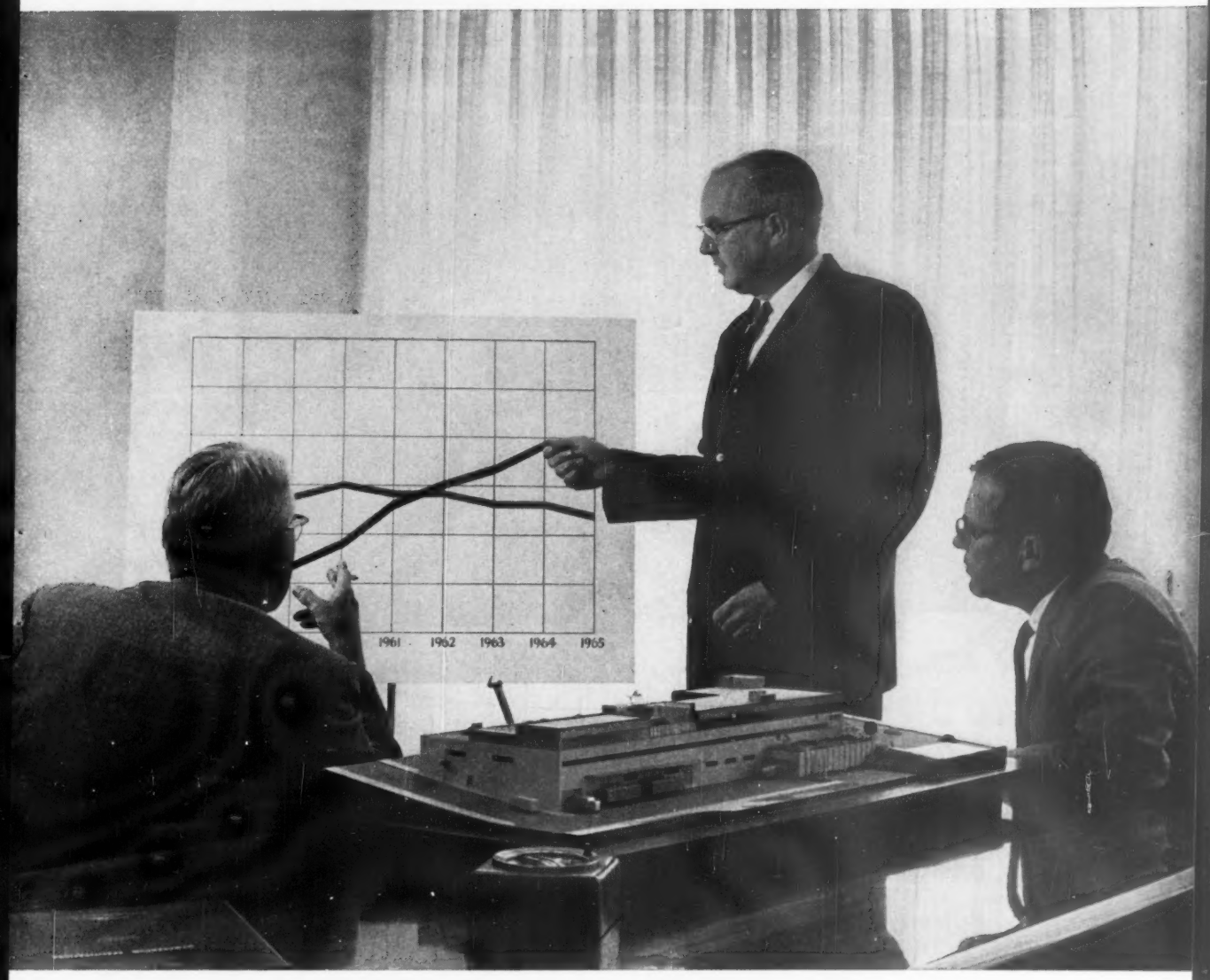
Edward J. Greenholt was named sales manager for the recently formed equipment development and manufacturing operations at **Philco Corp.'s** Lansdale, Pa., Div. He had represented Budd Co.'s Space Atomics Div. in the New England sales area.

Richard W. Benheim heads the newly created Plastic Div. of **L. H. Butcher Co.**, Los Angeles, subsidiary of Udylite Corp.

Buffalo Steel Corp., Tonawanda, N. Y., appointed **Allan C. Nelson** superintendent of rolling mill, **Arthur J. Steffes** superintendent of finishing and fabrication.

William C. Lewis Jr. was made research manager for process development, Ceramic Research Dept., **Corning Glass Works**, Corning, N. Y.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...



Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers designs and builds for the Steel industry...offers skilled experience in all types of facilities from raw material plants to finishing mills. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

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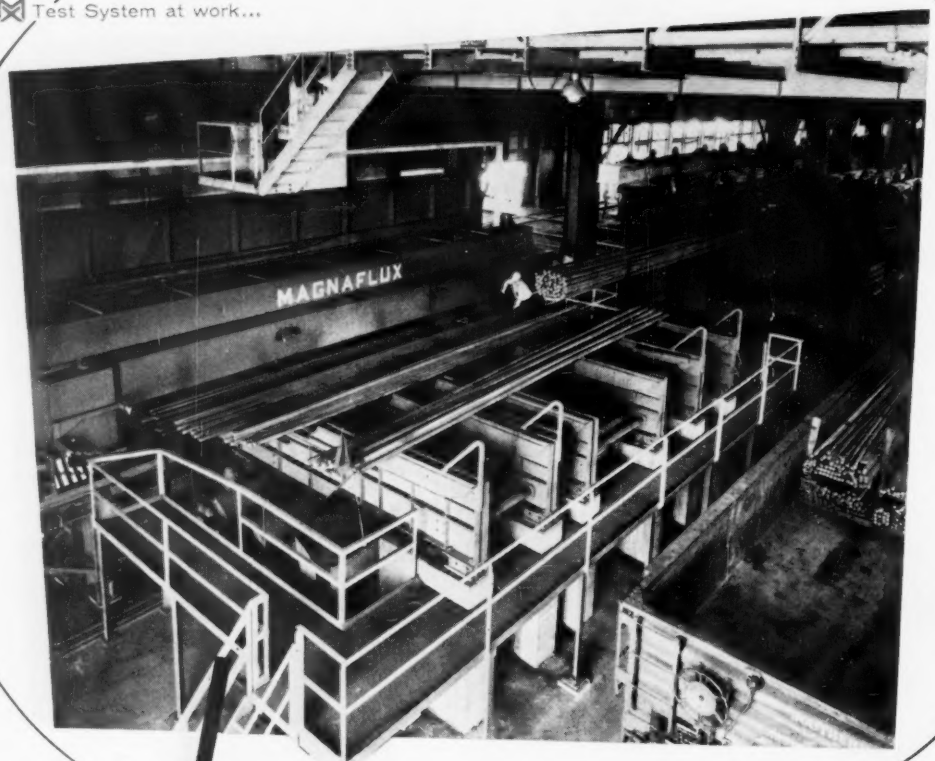
6229-S

Another Ⓜ Test System at work...



Another Magnaglo Billet Conditioning Installation

This complete Magnaglo system was designed and produced by Magnaflux Corporation. It is just one example of Magnaflux ability to engineer and fabricate complete automated handling and testing systems for the steel industry.

A well-integrated Magnaglo inspection and handling system gives you better, more complete, control of billet quality from conditioning. And you can control the Magnaglo sensitivity to identify only the seams you want to scarf. This makes possible increased mill yield, substantially reduced billet conditioning costs, and consistently higher quality in the semi-finished state.

More and more mills are taking advantage of the years of experience gained by Magnaflux, the pioneer developer of magnetic particle test-handling systems for billets, tube rounds, and welded or seamless tubing and pipe. Now, how can we help *you?* Phone your local MX Field Engineer or write to Magnaflux Corporation, 7312 West Lawrence Ave., Chicago 31, Illinois.

Ⓜ A SUBSIDIARY OF GENERAL MILLS

MAGNAFLUX CORPORATION

General Mills **TEST SYSTEMS**

MX Test Systems Include MAGNETIC PARTICLE, FLUORESCENT PENETRANT, THERMOGRAPHIC, EDDY CURRENT, ULTRASONIC, STRESS ANALYSIS, GAMMA RAY SERVICE, DYE PENETRANT & MAGNETIC FIELD

Armco Improving Facilities To Counteract Rising Costs

ARMCO STEEL CORP., Middletown, Ohio, has launched a $95 million construction program as another step in its $341 million, five year improvement plan. Projects valued at $101 million are under construction.

"The facilities in this program will help us to compensate for the rising costs of steelmaking," says Logan T. Johnston, president. "They will give us greater efficiency, further integrate our steel supplies with our rolling capacity, and allow us to make a wider size range of products."

Major projects in the latest program include new processing and finishing facilities at the Ashland (Ky.) Works of the company's Armco Div. and a combination slab and 160 in. plate mill at the Houston Works of the Sheffield Div. The facilities are scheduled for completion in 1962.

• **Ashland**—The new facilities at the Ashland Works will permit greater utilization of hot strip mill capacity at the plant, says Mr. Johnston.

• **Houston**—The combination mill at the Houston Works will enable Armco to produce wider and heavier plates for the rapidly growing plate market in the Southwest and Gulf Coast areas. By handling larger slabs, the mill is expected to contribute substantially to improved efficiency.

• **Middletown**—Armco has awarded a $150,000 contract to Stanat Mfg. Co., Westbury, N. Y., to supply a hot reversing mill and cold strip for the Armco Research Center in Middletown. The project is scheduled for completion in March, 1961. The hot mill will include provision for rapid reversal and reduction of hot billets which will be later reduced to strip and coiled under tension in the two high, four high cold mill. The cold mill will feature a hydraulically operated collapsing mandrel and coil stripping arrangement to facilitate coil handling. Both mills can be operated as two high or four high backup driven units; also, the cold mill can employ four high, direct work roll drive.

Vanadium-Alloys Expands

Vanadium-Alloys Steel Co. is constructing a 15,000 sq ft addition to the mill operated by its Anchor Drawn Steel Co. division at Latrobe, Pa. The new wing will expand operating and material storage areas and is scheduled to be completed on Feb. 1.

Milwaukee Plant Closed

Universal-Rundle Corp., New Castle, Pa., is closing its plant in Milwaukee and will transfer all production to Camden, N. J. Foundry operations ended Oct. 13 and other operations will be terminated by Oct. 30. The firm makes plumbing fixtures.

USI Joins Two Divisions

U. S. Industries Inc., New York, consolidated its Axelson Div., Los Angeles and St. Louis, and its Garrett Oil Tools Div., Longview, Tex., into Axelson-Garrett Div. Taylor Milton is president of the new division which will manufacture, sell, service, and distribute all USI oil and gas production, transmission, and allied equipment to the petroleum industry. Headquarters are in Longview.

Installs Breakdown Mill

Western Electric Co. has installed a breakdown mill, which converts slabs into strip, at its Hawthorne Works, Chicago. The firm casts its own alloys, then rolls them into strip, using some 30 million lb of ferrous and nonferrous metals and alloys annually. The mill reduces nonferrous bars from 0.410 in. to 0.180 in. in three passes; in the case of Permalloy, five passes reduce the material from 0.360 in. to 0.125 in. The mill can roll strip as fine as 0.060 in. Rolling Mill Div., E. W. Bliss Co., Salem, Ohio, built the mill, including slab and coil handling auxiliaries. The equipment handles 500 lb slabs and 2000 lb coils.

Steel Foundry Div. Moved

Bucyrus-Erie Co. is transferring its Steel Foundry Div. from Erie, Pa., to South Milwaukee, Wis. The move is part of the company's program to reduce costs and excess plant capacity. The firm will continue to make power cranes and shovels at Erie and will continue to operate an iron foundry there.

Federal Steel Expands

Federal Steel Corp. completed its second expansion in three years when equipment was moved from 3327 Elkton Ave. to 1 Janney Rd., Dayton, Ohio. The new plant provides 25 per cent more inside working area and three times as much outside area. The firm specializes in the automatic cutting of steel coils, sheets, and light plates.

Wilkoff Installs Shear

Wilkoff Co., Youngstown, has installed a 600 ton hydraulic shear which cuts 300 to 350 tons of scrap in 24 hours. The company can now cut up 25 railroad cars daily vs. ten before. Other facilities at the yard include burning and bundling equipment and cranes. In addition to handling scrap, the firm operates a steel service center and a structural fabricating division. It celebrated its 75th anniversary last week.

Republic Dedicates Mill

Republic Steel Corp., Cleveland, has dedictated its multimillion dollar plate mill at Gadsden, Ala. A four high, 134 in., reversing, hot rolling mill replaces a three high, 112 in. mill. With its 134 in. width, the new mill will allow Republic to increase the maximum diameter of its line pipe from 30 to 36 in., in case future developments in that field make the change economically desirable. The new mill will be able to shift quickly between its two main functions: Rolling skelp

(*Please turn to Page* 114)

FASTENOMICS

TIPS ON FASTENER APPLICATIONS BY STANSCREW

Socket Head or Hex Head Cap Screws? It All Depends on the Application

In selecting a Cap Screw, the conditions of a specific application may make the Socket Head, the Heat-Treated Hex Head, or the Bright Hex Head an obvious choice for greatest economy and most satisfactory performance. Stanscrew provides all three varieties, and we will attempt to point out the relative advantages of each.

Two Basic Differences

The essential differences between the three types of fasteners are their relative strengths and the conformations of the heads. In addition, the general appearance of the product will sometimes indicate using a particular fastener.

How Do Strengths Compare?

The table below gives the relative tensile, shear, and usable strength in tension of all three types of fasteners. The usable strength has been calculated based on the average pre-stressing of the fasteners to 80% of minimum yield strength.

SIZE	SOCKET HEAD CAP SCREWS			HEAT-TREATED (SAE Grade 5) HEX CAP SCREWS			BRIGHT HEX CAP SCREWS		
Diameter and Threads Per Inch	Minimum Tensile Strength (Based on 160,000 PSI)	Minimum Shear Strength (Single Shear)	*Usable Strength In Tension	Minimum Tensile Strength (Based on 120,000 PSI thru ¾" & 115,000 PSI for ⅞" & 1")	Minimum Shear Strength (Single Shear)	*Usable Strength In Tension	Minimum Tensile Strength (Based on 68,000 PSI)	Minimum Shear Strength (Single Shear)	*Usable Strength In Tension
¼-20	5,088 lbs.	2,544 lbs.	3,434 lbs.	3,816 lbs.	1,908 lbs.	2,442 lbs.	2,162 lbs.	1,081 lbs.	1,272 lbs.
⅜-16	12,400	6,200	8,370	9,300	4,650	5,952	5,270	2,635	3,100
½-13	22,704	11,352	15,325	17,028	8,514	10,898	9,649	4,824	5,676
¾-10	53,440	26,720	36,072	40,080	20,040	25,651	22,712	11,356	13,360
⅞-9	73,920	36,960	49,896	53,130	26,565	29,937	31,416	15,708	18,480
1-8	96,960	48,480	65,448	69,690	34,845	39,269	41,208	20,604	24,240

**Based on average pre-tensioning of the fastener to 80% of minimum yield strength*

Applications Pointers Based On Relative Strengths

By considering strength requirements, coupled with relative costs, the design engineer can often quickly determine the best fastener for a specific application.

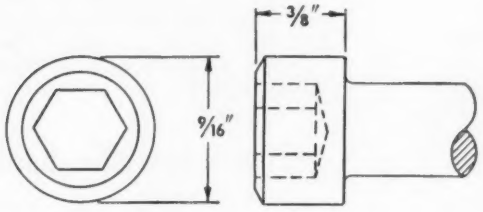
Here are some obvious examples:

1. When you need the greatest possible fastener strength in a limited joint area, socket cap screws are your obvious choice.
2. In rigid joints, heat-treated hex cap screws provide the greatest possible clamping force *per dollar cost.*
3. In bolting low strength materials, where high clamping forces cannot be applied without indentation, bright hex cap screws are the most economical selection.

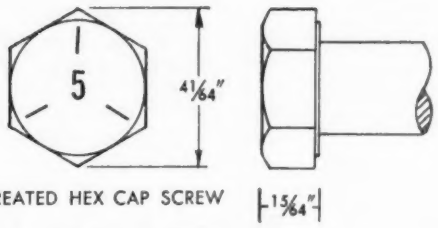
Additional information on the relative merits of heat-treated and bright hex cap screws is detailed in an earlier advertisement. (Copies forwarded promptly upon request.)

Difference In Head Size and Conformation

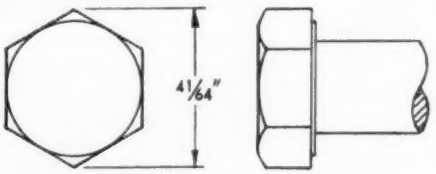
The drawings below show the relative dimensions and conformations of a typical socket and hex head cap screw (size used is 3/8" diameter.)



SOCKET HEAD CAP SCREW



HEAT-TREATED HEX CAP SCREW



BRIGHT HEX CAP SCREW

Application Pointers Based On Conformations

Again, the different head conformations dictate the use of a specific fastener for many applications. In crowded joints, smaller socket cap screws can often solve problems. They are obviously superior for flush mounting applications where counter-sinking is desired. In tight locations, they require far less wrench clearance.

Other wrenching factors also play an important part in determining whether socket or hex heads are best. If blind wrenching is indicated, socket heads are the outstanding choice. On the other hand, for consumer equipment, we can assume that conventional wrenches for hex head screws will be more commonly available than socket screw wrenches.

For industrial equipment, such as machine tools, this situation can be rectified by shipping the required socket wrenches (hex keys) directly with the product, attached to it in some simple fashion. Since hex keys are relatively inexpensive, compared with conventional wrenches, this enables the designer to provide customers with a more complete piece of equipment without appreciably raising the cost.

What About Appearance?

Although it is a somewhat intangible factor, a wise designer should consider the relative appearances of the two types of fasteners before arriving at his final selection. For example, in small-size precision equipment, socket head cap screws often contribute to a more finished, precision appearance. On the other hand, the use of only three or four fasteners to attach a large cover plate to a huge piece of equipment may present a somewhat incongruous appearance, even though they are adequate from the standpoint of tensile and other strengths. Here, a large number of less expensive fasteners may be more desirable.

Don't Create Inventory Problems

Overspecialization in selecting fasteners can defeat any economies realized, if it results in excessive inventories. Therefore, whenever possible, attempt to combine fasteners used for various applications. For example, good inventory practice usually indicates stocking only the strongest grade of any given fastener size and using it for all applications . . . except where extremely large quantities are involved.

For Further Information

Call your Stanscrew fastener specialist, for suggestions on your particular assembly problem. He is quickly available for consultation through your local Stanscrew distributor . . . who offers over 5,500 different standard fasteners . . . can supply an economical answer to almost every industrial fastening need.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

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Sheet and Plate Fabrication Catalog

SEE the endless variety of products, over 100 illustrations, contract manufactured since 1907 by Kirk & Blum in sheet and plate to ½" thickness, as well as light structurals.

SEE the extensive facilities and equipment of Kirk & Blum's 170,000 sq. ft. plant . . . for steel and alloy fabrications up to 25 tons.

SEE how Kirk & Blum can handle your needs, for 1 or 1000 units, economically and promptly, with traditionally high K & B quality.

Simply clip and send coupon below for your copy.

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Please send me my copy of new Fabrication Catalog.

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Firm_____

Address_____

City_____ Zone____ State_____

for the pipe mill and reducing slabs for the hot strip mill.

Enlarges Scrapyard

International Iron & Metal Co. Ltd. is constructing a $1 million processing yard for secondary materials at Hamilton, Ont. The project is scheduled to be completed by yearend. Equipment will include an hydraulic baler with a capacity of 100,000 tons annually. The main office of the firm is at 73 Robert St., that city.

Transformer Div. Sold

W. L. Maxson Corp., New York, sold its Langevin Transformer Div. to Intercontinental Electronics Corp. The Langevin operation will be moved from Old Forge, Pa., to Westbury, N. Y., to be integrated with Intec's Magnetics Dept. to form an Intecoil Mfg. Div. Albert Schneider is business manager of the new division; Raffee Mgrdechian, chief engineer.

Producto Broadens Line

Producto Machine Co., Bridgeport, formed a new unit, Plastics Machinery Div., for the design, development, and manufacture of plastics machinery. The division will introduce its line of blow molding and sheet forming machines and accessory equipment in November.

Harvey Aluminum Expands

Bonneville Power Administration has signed an agreement to supply electrical power for an aluminum reduction plant to be built in the Northwest by Harvey Aluminum, Torrance, Calif. Site selection is to be made by July 1, 1961. Operations are scheduled to start in 1963.

Construction of the first phase of an aluminum sheet, plate, and strip mill to produce standard mill products has been authorized by Harvey Aluminum's board. The facility will increase the company's fabricating capacity for mill products to more than 150,000 tons annually. Harvey's primary reduction facility is producing at the rate of 60,000 tons a year. Officials of the company believe that the annual growth

When fastenings fail...

it may be your reputation that suffers most

When so much literally hangs on a bolted connection—as in this swing—the importance of a single nut becomes dramatically clear: *If the nut lets go, tragedy!*

In a sense the same is equally true of complex and costly products like farm equipment, washing machines, computers—or any other product you make that is subject to vibration when it is operating.

If your customers can't count on critical connections staying tight under punishing field conditions—and, even should the actual damage be slight—if they're faced with failure and expensive downtime because a nut lets go —you've had it when it comes to reorders!

The moral is clear. You simply can't afford to have your product's reputation for reliability ruined by fasteners that can't be relied on.

For more than 20 years, many of America's top manufacturers have relied on Elastic Stop® nuts to protect their product's reputations. They've learned that Elastic Stop nuts with their exclusive nylon locking inserts *simply will not work loose!* Not under the toughest impact, shock or vibration! Never! They stay put to give your product low cost insurance against fastener failure —the kind of insurance you can't afford to be without!

When you remember that reorders are written in your customers' maintenance records, you'll want to see how these leading companies protect the good name of their products with Elastic Stop nuts. Write for our interesting Bulletin No. 5901 Dept.S46-1060,Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

ESNA®

for the ring of reliability

ELASTIC STOP NUT CORPORATION OF AMERICA

Don't take chances on couplings

CHECK PUBLISHED MISALIGNMENT RATINGS BEFORE YOU BUY

Since misalignment is the basic problem that shaft couplings are designed to solve you'll find a published conservative misalignment rating (along with load capacity rating) for every Fast's Coupling. Compare it with the misalignment rating of any other coupling you are considering.

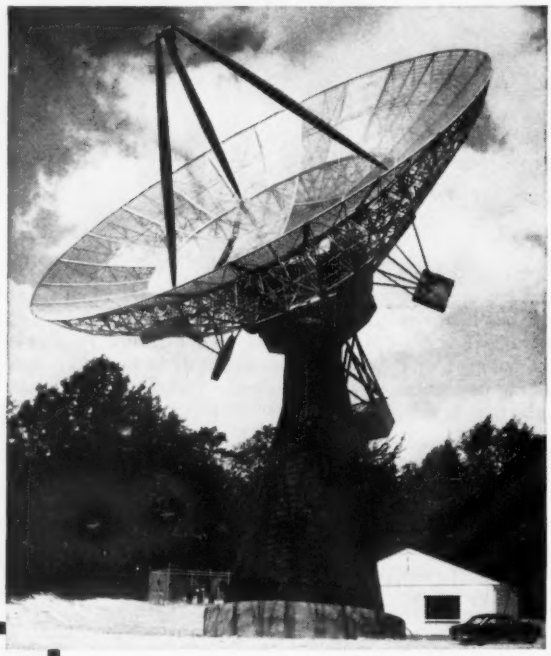
One further advantage of Fast's Couplings' misalignment ratings: You save money on installation because, knowing the ratings, you don't have to line up driving and driven elements with pinpoint accuracy. It's one more important reason why Fast's Couplings are the choice of more equipment manufacturers than any other gear-type coupling. KOPPERS COMPANY, INC., 310 Scott Street, Baltimore 3, Md.

KOPPERS

FAST'S COUPLINGS

Engineered Products Sold with Service

One rpm per day



CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive **double-enveloping worm** gear set used in the complex drive system was held to 0.0012-inch.

Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

in primary aluminum over the next ten years will average about 8 per cent.

NEW PLANTS

Warehouse Div., Atlantic Steel Co., Atlanta, opened a steel service center at 12 Crigler Drive, Greenville, S. C. W. P. Cole is branch manager. He's assisted by A. J. Vaccaro.

American Can Co., New York, will build a 145,000 sq ft plant at Chambersburg, Pa., to produce packaging materials for food.

O'Neal Steel Inc., Birmingham, will open a steel service center in Jacksonville, Fla. The building will provide more than 20,000 sq ft of floor space and will cost $250,000. Manager will be J. M. Mott.

Corhart Refractories Co., Louisville, will build a plant at Buckhannon, W. Va., for the manufacture of refractory materials. The firm is a wholly owned subsidiary of Corning Glass Works, Corning, N. Y.

Van Pelt Corp., Detroit, will build a plant at Winamac, Ind., which will be operated by the Plymouth Tube Div., producer of cold drawn steel tubing.

Sparton Corp., Jackson, Mich., will build a military electronics facility at Albuquerque, N. Mex. The 50,000 sq ft plant will be operated by a subsidiary, Sparton Southwest Inc.

Indiana Cap & Set Screw Co., Franklin Park, Ill., opened a 15,000 sq ft warehouse at 2654 Kenzie Terrace, Minneapolis, Minn. (not Milwaukee as inadvertently stated in the Sept. 26 issue of STEEL). The firm makes and distributes fasteners. The warehouse is managed by Ron Herrick. Ray Rasmussen is in charge of all Minnesota sales.

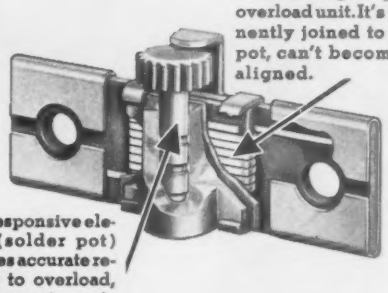
Wheel Trueing Tool Co., Detroit, will build a 50,000 sq ft plant in Plymouth, Mich. The plant is scheduled to be occupied by September, 1962, and will allow con-

(*Please turn to Page* 120)

ONLY SQUARE D STARTERS WITH 1-PIECE OVERLOAD RELAYS GIVE *Absolute* PROTECTION!

• Only Square D makes thermal overload relays with 1-piece construction—and only with 1-piece construction can you *know* you've installed the heater correctly. Square D 1-piece overload relays can be installed only one way. They are factory-assembled, individually tested and calibrated, completely tamper-proof. Repeated tripping will not affect accuracy.

You *pay* for overload protection—be sure you *get* it. Insist on Square D 1-piece overload relays for *absolute* protection.



Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

EXCLUSIVE— 1-piece Overload Relay for *ABSOLUTE* Protection!

Mail coupon today for simple "jig-saw" demonstrator —see why only Square D gives absolute protection

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Please send me information on Square D magnetic starters, along with your simple 3-minute "jig-saw" demonstrator

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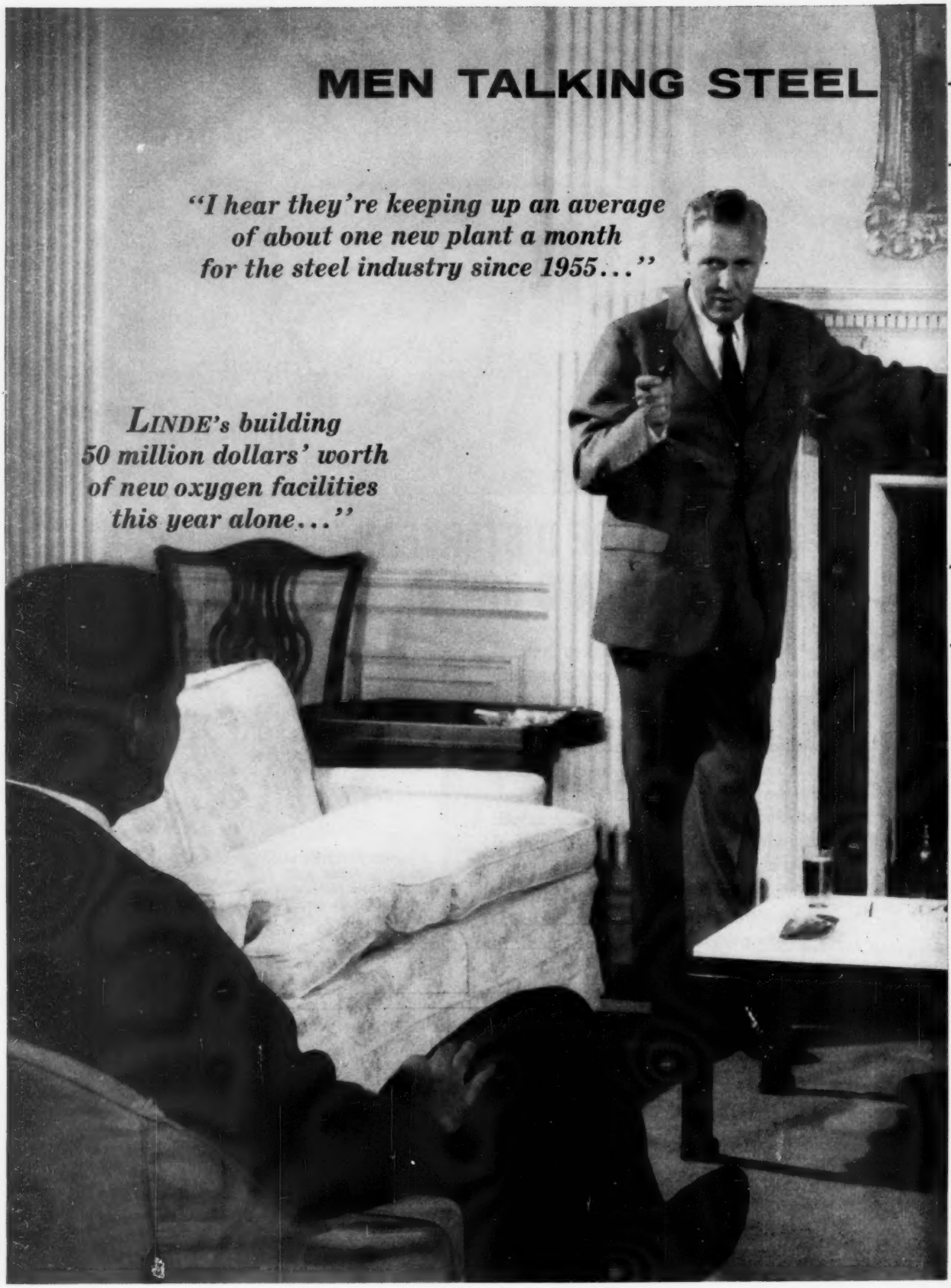
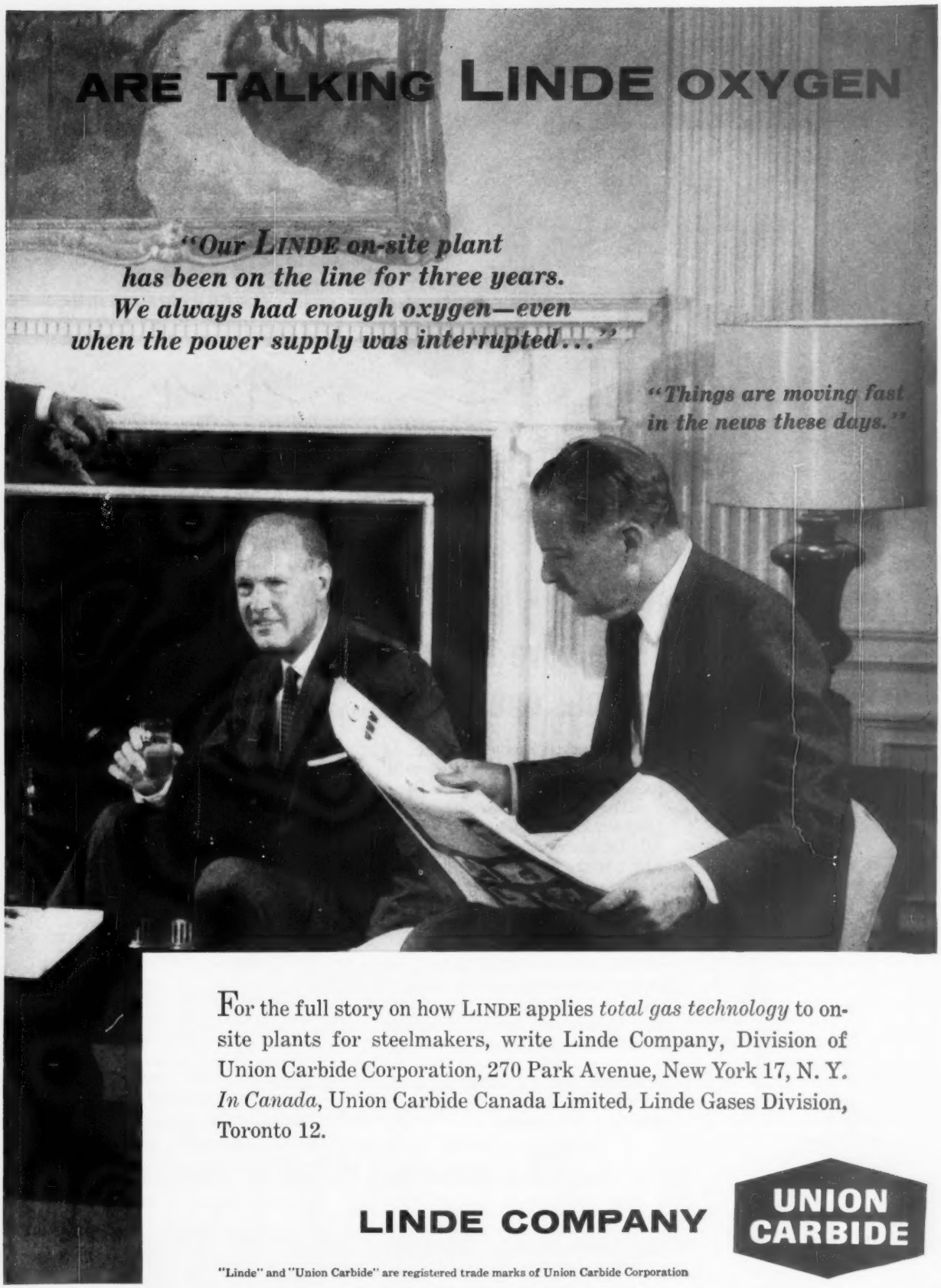

MEN TALKING STEEL
"I hear they're keeping up an average of about one new plant a month for the steel industry since 1955..."
LINDE's building 50 million dollars' worth of new oxygen facilities this year alone..."

ARE TALKING LINDE OXYGEN


"Our LINDE on-site plant has been on the line for three years. We always had enough oxygen—even when the power supply was interrupted..."
"Things are moving fast in the news these days."

For the full story on how LINDE applies *total gas technology* to on-site plants for steelmakers, write Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada*, Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

LINDE COMPANY

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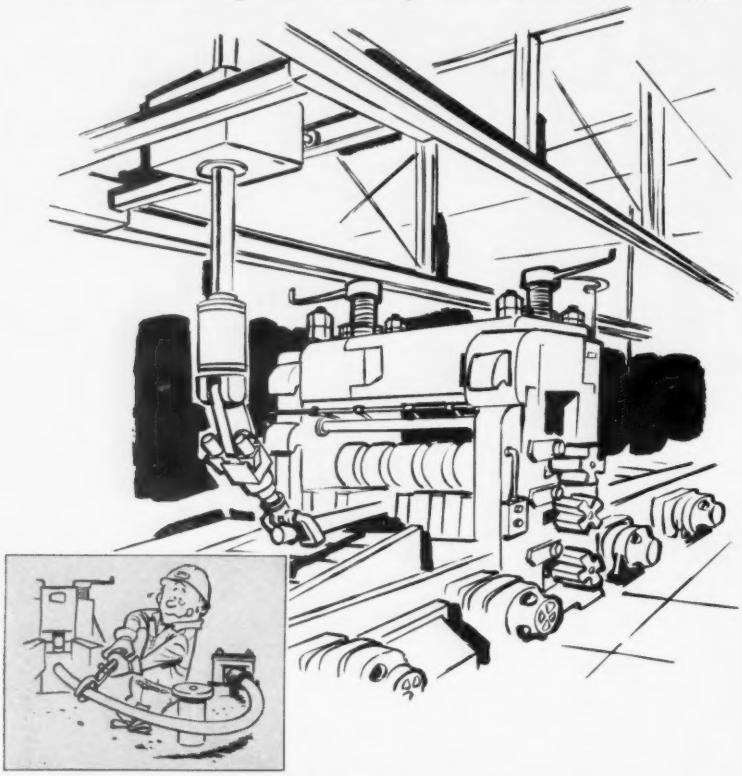
New twists in programmed manipulation from General Mills



END THE STRAIN! Remove the risk in hazardous handling operations

Here's one way a General Mills Mechanical Arm could be used to handle glowing hot, springy stock in a rod drawing mill. There are hundreds of other areas where the Mechanical Arm can free workers of drudgery, danger and boredom inherent in many industrial tasks . . . *and* save you money!

Whenever the situation calls for brawn and careful placement, a Mechanical Arm fills the bill . . . combining Herculean strength and a watchmaker's deftness. Coupled with a General Mills analog controller, the Mechanical Arm can perform a complex series of wrist-arm motions . . . endlessly, tirelessly and without human error!

Flexibility of the General Mills controller permits low-cost change of instructions for inline production at other stations . . . or even switch to manual remote control. Initial instructions are recorded on a plastic chart by manual operation of the master console. Thereafter, electronic playback duplicates complex wrist actions.

For more facts about programmed manipulation, write for *Automatic Handling: General Mills, Nuclear Equipment Dept., 419 North Fifth Street, Minneapolis 1, Minnesota.*

Nuclear Equipment Department

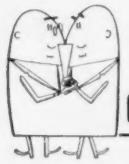
General Mills **MECHANICAL ARMS**

First in Remote Handling

(*Concluded from Page* 116)

solidation of the operations that are now carried on in four Detroit locations.

Phillips Electrical Co., Brockville, Ont., opened a wire and cable plant at Woodside, N. S. The plant covers 23,000 sq ft and cost, including equipment, about $600,000.



CONSOLIDATIONS

Algoma Ore Properties Ltd. and **Canadian Furnace Co. Ltd.** have been merged into their parent firm, **Algoma Steel Corp. Ltd.**, Sault Ste. Marie, Ont. The former subsidiaries are now known as the Algoma Ore Properties Div. and Canadian Furnace Div.

Studebaker-Packard Corp., South Bend, Ind., acquired **D. W. Onan & Sons Inc.**, Minneapolis, builder of electric generating plants and will operate the property as the Onan Div.

Charter Wire Inc., Milwaukee, purchased the **Racine Iron & Wire Works**, Racine, Wis. The Racine firm produces a number of wire products, including wire forms, fan guards, rings, wire racks, and wire fry baskets.

T. L. Smith Co., Milwaukee, manufacturer of concrete mixers, purchased **L. O. Gregory Mfg. Co. Inc.**, Memphis, Tenn., supplier of concrete batching equipment.

NEW OFFICES

Hercules Motors Corp., Canton, Ohio, opened a factory branch at 161 E. Hunting Park Ave., Philadelphia. Burt Vodden is branch manager. Hercules produces internal combustion engines.

Indiana General Corp., Valparaiso, Ind., established a sales office at 916 Liverpool Rd., Liverpool (Syracuse), N. Y. E. J. Travers is the sales engineer in charge of the office. The company produces permanent magnets, ferrite materials, and a range of products utilizing those materials for electronic, ma-

MAJOR REASONS FOR SPECIFYING NATIONAL ELECTRODES...

QUALITY · SERVICE **DELIVERY** FACILITIES!

"NATIONAL" electrodes are well packaged and shipped by the latest equipment available!

Whether your "National" electrodes are received by rail or truck, each one is protected by specially designed end caps to keep dirt and dust out of the socket, and to protect against end-face chipping. To facilitate handling, the majority of electrodes are palletized.

In attempting to offer new savings to electric furnace operators, in 1957, NATIONAL CARBON in a joint effort with Evans Products Company, developed damage-free gondola cars for electrode shipments. This equipment requires minimum dunnage yet carries substantially larger loads. Unloading is quick and simple. Recently, in co-operation with a leading railroad, NATIONAL CARBON is making west coast shipments of electrodes 20 inches in diameter and smaller in new high-side, damage-free gondola cars. The increased capacity of these cars makes possible a reduced transcontinental freight rate on shipments in excess of 110,000 pounds.

These developments are efforts by NATIONAL CARBON to offer important new savings to electric furnace operators, whether they occur in packaging and delivery methods . . . in improvements in product quality . . . in the results of an overall service program or in the facilities of our five domestic production plants. For details, contact National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.

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Leading manufacturers everywhere are cutting costs and increasing worker-safety by changing to Jomac terry cloth work gloves. Jomacs are made of thick loop-pile fabric that cushions the hands, protecting them against sharp edges and rough surfaces. They are made from various weights of cloth for specific applications. Any two make a pair, since they are completely interchangeable, and they can be reconditioned time after time—will give extraordinary wear. Fill in the coupon below for more information and a free copy of the Jomac Work Glove Catalog.

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terial handling, and magnetic separation applications.

NEW ADDRESSES

Korfund Co. Inc. moved to new quarters on Cantiague Road, Westbury, N. Y. The company specializes in the measurement and control of shock, vibration, and noise.

Joseph T. Ryerson & Son Inc., warehousing subsidiary of Inland Steel Co., moved its general offices into its new building at 2621 W. 15th Place, Chicago, Ill.

Dis-Die Steels Inc. moved to 25133 Flanders Rd., Warren, Mich. The company specializes in pretempered and hot work steels for die-casting and extrusion tools. It also supplies flat die forgings, drop forgings, and extrusion tooling.

ASSOCIATIONS

Institute of Appliance Manufacturers, Washington, elected these officers: President, Sol Goldin, Whirlpool Corp., St. Joseph, Mich.; executive vice president, A. B. Ritzenthaler, Tappan Co., Mansfield, Ohio; secretary, E. Carl Sorby, Geo. D. Roper Corp., Kankakee, Ill.; treasurer, S. B. Rymer Jr., Dixie Products Inc., Cleveland, Tenn.

Metallurgical Society of the American Institute of Mining, Metallurgical & Petroleum Engineers, New York, elected these officers: President, J. S. Smart Jr., American Smelting & Refining Co., New York; vice president and president-elect, K. L. Fetters, Youngstown Sheet & Tube Co., Youngstown.

National Security Industrial Association, New York, elected these officers: President, E. V. Huggins, Westinghouse Electric Corp., Pittsburgh; chairman, board of trustees, H. E. Isham, Westfield Metal Products Co. Inc., Westfield, Mass.; vice chairman, W. P. Gwinn, United Aircraft Corp., East Hartford, Conn.; and first vice president, C. F. Adams, Raytheon Co., Waltham, Mass.

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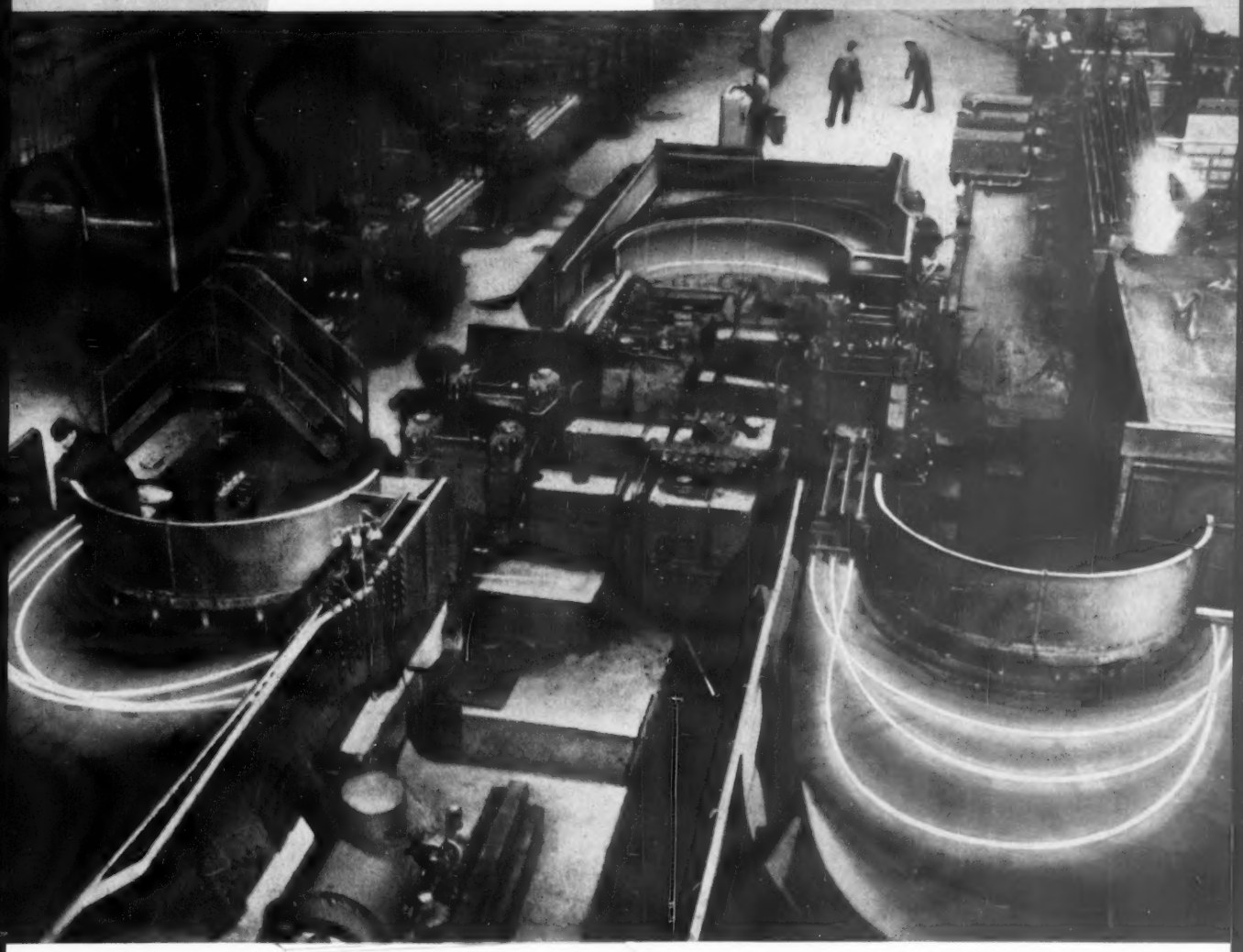

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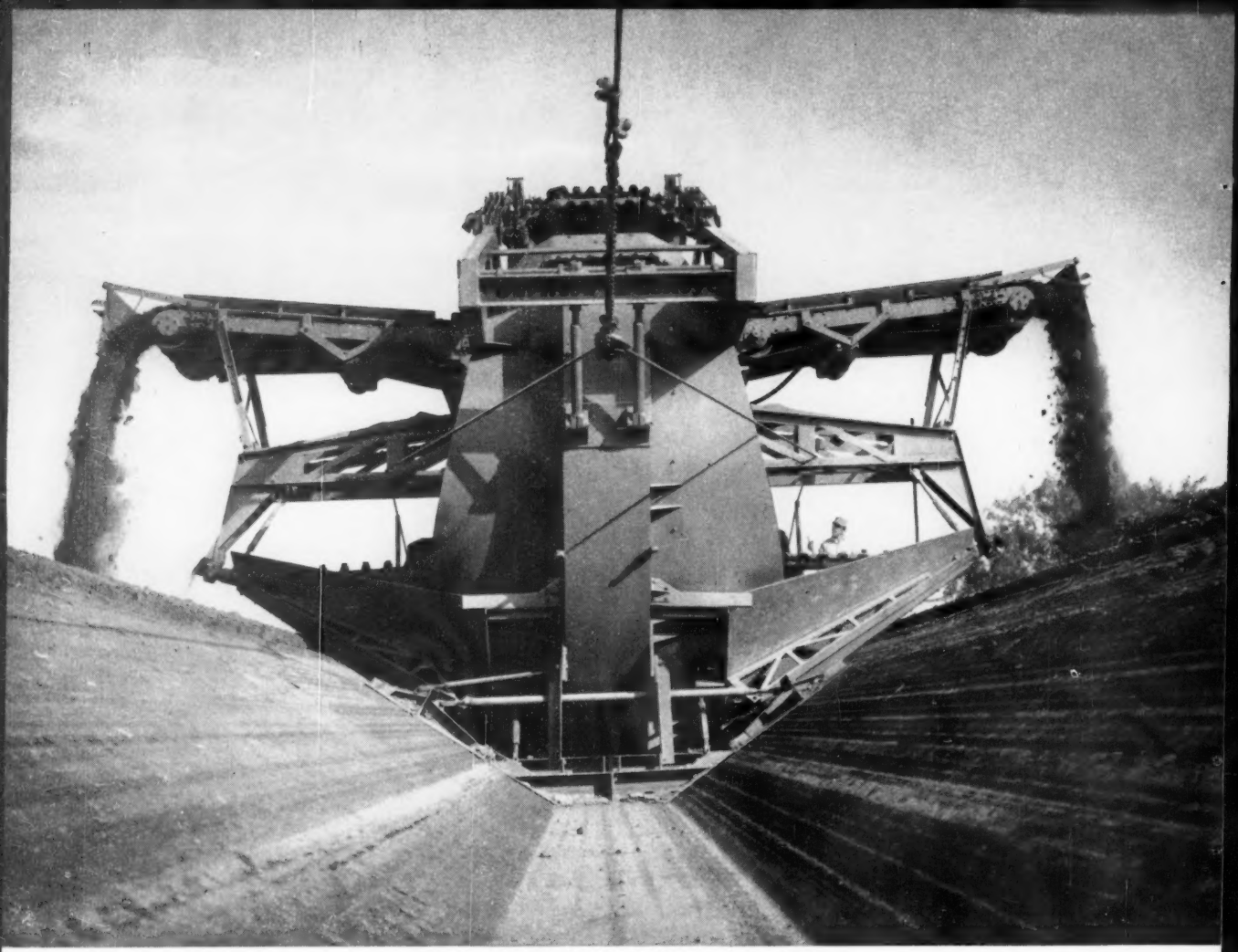
UNITED *can serve you no matter where in the world you are.*



World's fastest ditcher...rugged proof of M&T Murex electrode welding quality

In one minute this monster machine carves out seven continuous feet of ditch 6′ deep, 4′ across, at the bottom, 22′ across at the top. Working at top capacity of 800 cubic yards of earth an hour, the ditcher could keep a large fleet of dump trucks mighty busy. Gar Wood Industries relied on M&T Murex electrodes to give the ditcher's all-welded frame the brute strength needed to do its Herculean job.

It's a vote of confidence in the quality of Murex electrodes and M&T service when one company after another singles them out for the important welding jobs. Super tanker . . . world's largest power shovels . . . welded buildings . . . award winning bridge—these are some of the many other outstanding jobs done with Murex electrodes—where their performance in the hands of the weldor and in the working product explains their fine reputation among engineers and production men everywhere.

This is one of the world's broadest, and most carefully manufactured, lines of electrodes. Over 1000 types and sizes . . . and serviced by men who know their business. Ask the M&T man for details or recommendations. Or send for literature on the Murex line of electrodes.

M&T **welding products** · plating products
metals · coatings · chemicals

METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey

Technical Outlook

STAINLESS ENGINES AHEAD?—One horsepower per pound of weight, more than 1 hp per cubic inch of displacement, and 12:1 or 14:1 compression ratio: Those are the specifications for the Tyce-Taylor dual overhead engine developed at Tyce Engineering Corp., Chula Vista, Calif. Constructed somewhat like the old Crosley auto engine, brazing is widely used to join many thin stainless sections. First applications: Aircraft, race cars, missiles, boats, and several military vehicles.

MUSCLE BUILDING NEUTRONS—Researchers at Phillips Petroleum Co. report that stainless steel exposed to a constant stream of neutrons for 18 weeks nearly doubles in hardness and yield strength—and becomes almost twice as brittle. The firm is operating two Atomic Energy Commission "hot cells" to investigate the effects of neutron bombardment on metals.

ELECTROSTATIC UPTURN—Detroit automakers report they're keeping close tabs on developments in electrostatic spraying devices. If several developers succeed in marketing a greater variety, at least one source predicts that electrostatic spraying will be in for a boom. Most recent convert (rumored): Chrysler's Indianapolis plant.

PREVENTS TARNISH—A new chemical developed by Union Carbide Corp., New York, effectively forestalls tarnishing of silver. Main drawback: Poor abrasion resistance.

IMPROVED SCREW STOCK—A new aluminum alloy, 6262-T9, is stronger and more machinable than standard 6061-T6 in fasteners and specialty machined parts, claims Aluminum Co. of America, Pittsburgh.

BRAZING BASICS—Lithium-boron combinations are ideal constitutents for airproof brazing alloys, say N. Bredzs and H. Schwartzbart, Armour Research Foundation of the Illinois Institute of Technology, Chicago. Reasons: 1. Both have a high affinity for oxygen. 2. Their oxides form compounds which melt at lower temperatures than silver and copper base brazing alloys. 3. Lithium borates are excellent fluxes. The researchers presented their conclusions at the fall meeting of the American Welding Society.

BRAZING ADVANCE—Participants at the fall symposium of the American Welding Society learned of a new technique for high temperature brazing which overcomes poor fitups. Developed by General Electric Co., Schenectady, N. Y., the method relies on a complex mixture of two alloys with separate melting points to bridge gaps up to 0.060 in. During brazing, the mix forms a kind of slurry which bonds metallurgically with the base metal.

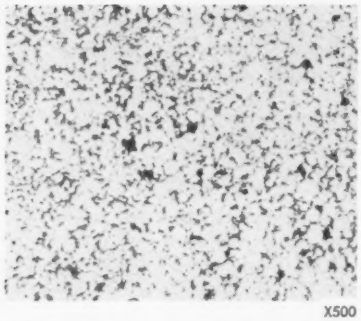
FOREIGN NOTES—The British and Russians are going after higher top pressures in blast furnace operations than we are, says Bruce S. Old, senior vice president, Arthur D. Little Inc., Cambridge, Mass. He says the Russians are also making progress in the continuous casting of steel. They also desiliconize hot metal with oxygen in the ladle.

LOW ALLOY TREND—A substantial amount of U. S. Steel's Man-Ten (70,000 psi carbon structural) is going into construction of a new Chicago office building for United Insurance Co. of America. Advantages: Less weight, and thinner sections which don't take up so much interior floor space.

NOT SO NOISY—Welding and grinding are low on the list of noisy processes; forges, riveters, chippers, and hammers are high, reports the Department of Scientific & Industrial Research, Great Britain. It's concerned (for health reasons) about high noise levels in British factories.

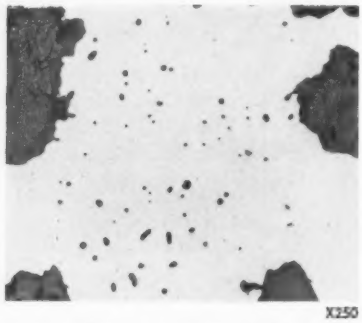
MOLYBDENUM PROGRESS—Largest molybdenum sheet we've heard about has been produced by Refractomet Div., Universal-Cyclops Steel Corp., Bridgeville, Pa. It measures 48 by 105 by 0.060 in. Significance: Reduction in the number of joints needed in large structures.

Researchers Score Three Bull's-Eyes In Explosive Metalworking



X500

Tungsten powder compacted to 85 per cent theoretical density with explosives looks like this. Note that particle bonding or welding is widespread



X250

Explosive compacting of a 75-25 mix of nickel—ceramic dispersion in a stainless steel tube has been sintered at 2000° F. Density is better than 88 per cent of theoretical. Mix and tube have been welded together by the explosive at several points

Basic work shows that brittle ceramics and metal powders can be shaped, pressed, even welded. Practical studies combined with metallographs provide key data

FURTHER PROBES into the why of explosive metalworking have turned up some unusual results.

Charles Simons, principal metallurgist, and Stanley Porembka, assistant division consultant, Battelle Memorial Institute, Columbus, Ohio, say their tests demonstrate that we've scarcely begun to appreciate the potential of the new art.

Here are three examples:

1. They corrugated and sized metal tubes containing extremely brittle cermet cores.
2. They put stainless cladding on stainless-ceramic tubes in a single blast. (Compacts did not require heat treatment.)
3. They hardened copper plates from Rb 20 to Rb 100 without fracturing the metal.

• Battelle research people have confined themselves to difficult shapes and materials. They have employed two basic techniques.

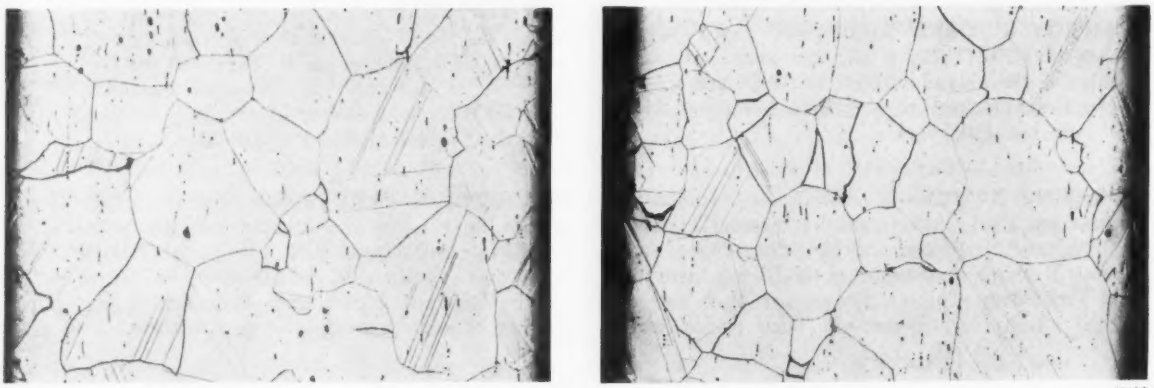
The shock wave (or pulse) and pressure pack the wallop in explosives. Some parts are more easily formed by minimizing shock and emphasizing pressure. Such systems are called confined and unconfined.

In pressure confinement, a comparatively small amount of explosive is detonated within a heavy die partly covered to restrict the expansion and dissipation of energy. An unconfined system simply has a larger charge placed over the part and die.

A transmittal medium provides most of the means for getting the shock wave and pressure to force the part into shape. Battelle has used all the well known ones: Water, loose powder, air.

The cermet-cored corrugated tube was formed in two steps in a confined or pressure retaining rig under water. It is made from a stiff metal with a brazed seam. In one case, the tube was given an intermediate annealing to insure freedom from cracking.

Another application involved siz-

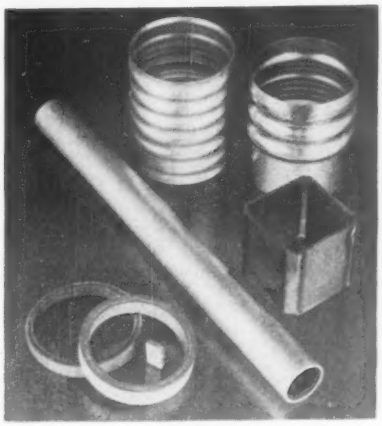


X100

Photomicrographs of the explosively corrugated Nichrome sleeve (see exhibit, Page 127) show that practically no change took place in the microstructure after explosive forming (lower half)

Experts Term These Explosively Formed Items 'Unusual' . . .

- Ring (extreme left) is cross section of explosively compacted tungsten powder (85 per cent of theoretical density) between concentric steel tubes.
- Second ring contains nickel-ceramic compact (87 per cent of theoretical density) between concentric steel tubes.
  Small square in ring is same material, but density is more than 97 per cent of theoretical density.
- Long tube is made from concentric stainless tubes (0.010 in. walls) filled with a stainless-ceramic compacted explosively to more than 97 per cent of theoretical density.
- Square tube is supposedly unformable Zircalloy-2.
- Corrugated sleeve (left) is explosively formed metal tube with a cermet core. It was done at room temperature. The other corrugated sleeve is made of Nichrome.



ing a Zircalloy-2, square tube—other experts said it couldn't be explosively formed. Battelle first tried the job in a confined system, but the part ruptured. Success came on the second try through holding the pressure longer and cutting the charge and forming rate.

• Powder compacting of brittle or glasslike powders can also be done with the contained pressure approach.

Fuel elements for atomic reactors must be clad with a noncorrosive material like stainless. The ceramic dispersion is refractory and doesn't respond well to ordinary compacting methods.

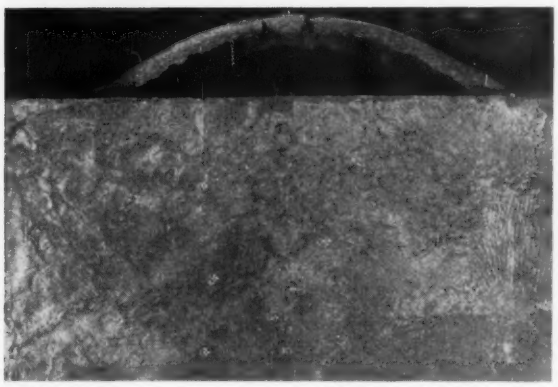
The Battelle team has stainless clad a stainless-ceramic dispersion tube with a density approaching 95 per cent of theoretical. Here's how:

A stainless tube is put into a close-fitting die. A second, much smaller tube is centered inside, and the space between filled with the dispersion powder. A length of Primacord explosive is stretched through the middle and detonated. The pressure forces the inside tube against the powders, compacting them. Micrographs clearly show that the structure is like a sintered product, but neither heat nor binder is used.

Similar possibilities listed by Battelle include: Making tubes out of difficult powders, bonding cermets, refractory metal compacts. (Nickel-ceramic dispersions and tungsten have been compacted to about 85 to 88 per cent of theoretical density without heat.)

• Buffers of hard rubber have enabled Battelle to harden some nonferrous metal.

Some metals have been hardened by Du Pont and other Eastern firms (STEEL, May 4, 1959, p. 84). Du



Many experimenters have given up the idea of hardening nonferrous metals. Left photo shows why. Battelle technique, which includes a hard rubber buffer, raises this copper plate to Rb 100

Pont's sheet explosive has been useful, experts say.

Occasionally, the edges of plates will spall under explosive impact. Battelle has discovered that a sheet of hard rubber between the Du Pont explosive and the part masks the force sufficiently to avoid spalling.

The copper plate (illustrated) can be hardened to Rb 100 without deformation. Nickel has also been hardened the same way. Under the same conditions, annealed H-11 apparently transforms to martensite to some extent.

Such hardening seems to reduce fatigue properties, say some investigators. The reason: Metallographic checks of explosively hardened H-11 specimens (with an air medium) showed shear bands which could act as stress raisers. Battelle employed underwater techniques to modify the shock, thus decreasing the number of shear bands and the possibility of cracking.

• R. J. Carlson, assistant division chief, feels that there is still too big a gap between the blacksmith approach and fundamental research in forming. He also believes that the method should not be used to compete with regular high volume production on large presses.

The techniques which Battelle has developed, says Mr. Carlson, are all attempts to solve a specific problem—much more work needs to be done before they can be put into production.

"We note that many people have been disillusioned without sufficient cause. There has been too much publicity on simplicity. Explosive forming is easy only after you get the knowhow, and the getting is complex. Much data are available, but they only apply to one part."

The biggest key to success, says Mr. Carlson, is a realization that working forces vary widely in different explosive metalworking systems. "You must not make the mistake of evaluating from the experience of one material and one operation in a single metalworking system."

Have You Entered?

See Pages 5 and 6.

Cylinder Blocks Beefed Up With Cast Iron Inserts

Camshaft bores and cylinder inserts, loaded into the diecasting mold before molten aluminum is injected, are said to have the hardness needed for long engine wear

DIECAST ALUMINUM blocks with cast iron cylinder sleeves are expected to increase engine life in automobiles marketed by American Motors Corp., Kenosha, Wis.

The six cylinder, in-line blocks are being made by Doehler-Jarvis Div., National Lead Co., Toledo, Ohio. Doehler-Jarvis built the 2000 ton diecasting machines used in the operation.

• Centrifugally cast liners are said to have greater hardness than the material previously used in cylinder blocks.

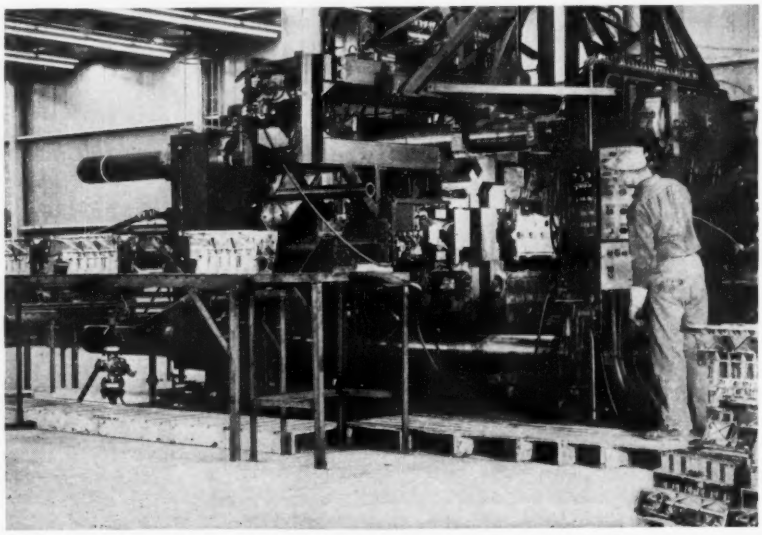
The cast-in liners, joined mechanically to the aluminum in a bimetallic interlock bond process developed by Doehler-Jarvis, have shown superior wear characteristics in mechanical tests.

Brinell hardness of the liners is said to be 230 to 260 vs. 170 to 200 for the cast iron previously used in the blocks. Greater hardness and lower cylinder wall temperatures are said to lengthen the life of the blocks.

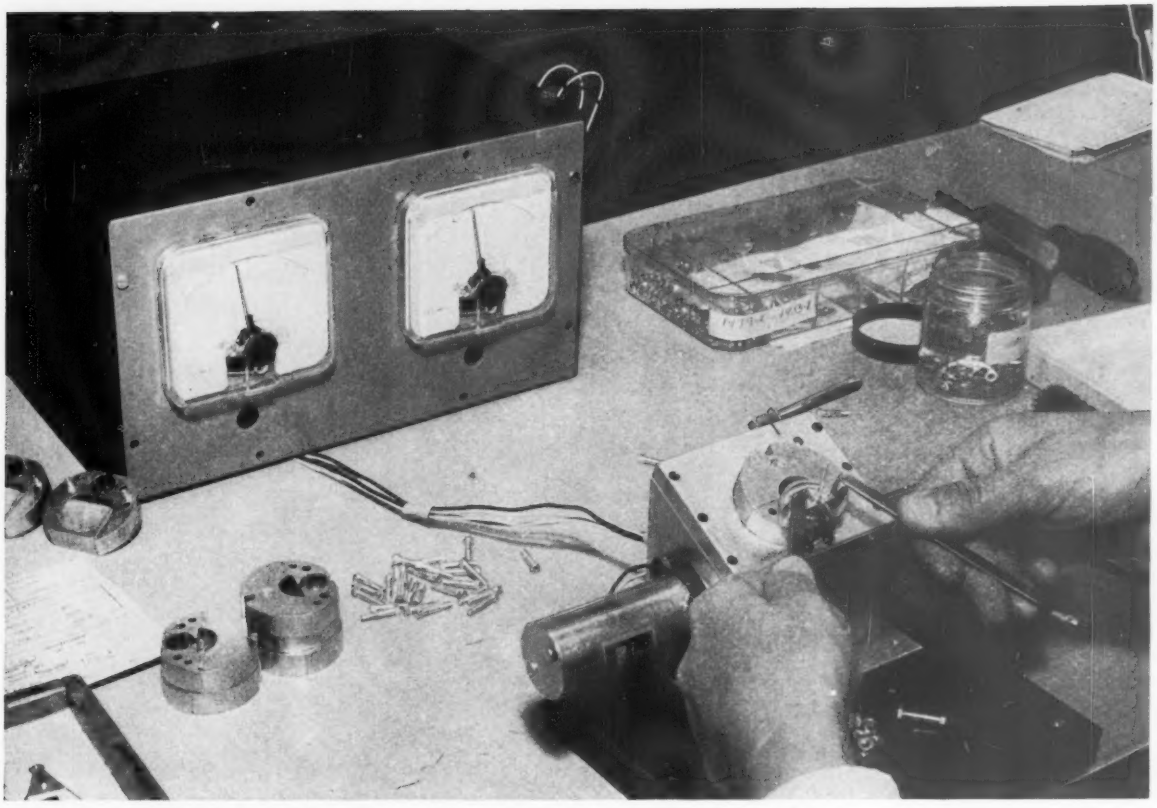
• Metering of molten metal and placement of iron inserts are automatic operations.

Each shot of molten aluminum (65 lb) is poured into the hot sleeve by an automatic ladle; the aluminum is injected into the die in 0.3 second, under 8000 psi pressure. Dies are held against the high pressure by large, hydraulic cylinders and mechanical locks on the side cores.

Loose pieces, such as camshaft bores and cylinder inserts, are fed into the dies automatically. Previously, the practice of adding loose parts in diecasting was undesirable because it slowed production.

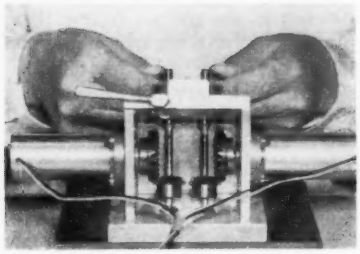


Molten aluminum for an automobile engine block is injected into a die in one-third of a second by this automatic diecasting machine, rated at 2000 tons



Meter relays (rear) shut off driving motors which tighten the nuts under the wrenches held by the operator. Accuracy is said to be within 1 per cent of full meter scale

Small Motors Used To Tighten Nuts



Rear view of tightening fixture shows gearing arrangement to 0.002 hp motors, which are adequate for precise instrument work

SPEED AND CONTROL are the principal benefits of a new way to tighten nuts on fasteners.

The method, developed by Assembly Products Inc., Chesterland, Ohio, employs electric motors to turn the nuts. Torque is controlled by meters which measure the electrical input to the motors and turn them off when a preset value is reached.

Accuracy is said to be within 1 per cent of full scale meter reading. The method is easily adaptable to almost any kind of tightening job.

• Motor load on each nut being driven is indicated by a meter-relay.

Each relay can be adjusted to limit the amount of current going into the motor—at whatever level the motor will drive the nut to the proper degree of tightness. Each meter has two pointers—one which sets the upper limit, the other indicating the load being drawn. When they meet, a switch turns off the driving motor.

Time varies with each nut but has no effect on tightness, says Assembly Products. Meter relays have a repeatability rate of less than 1 per cent of full scale, so driving current is almost constant.

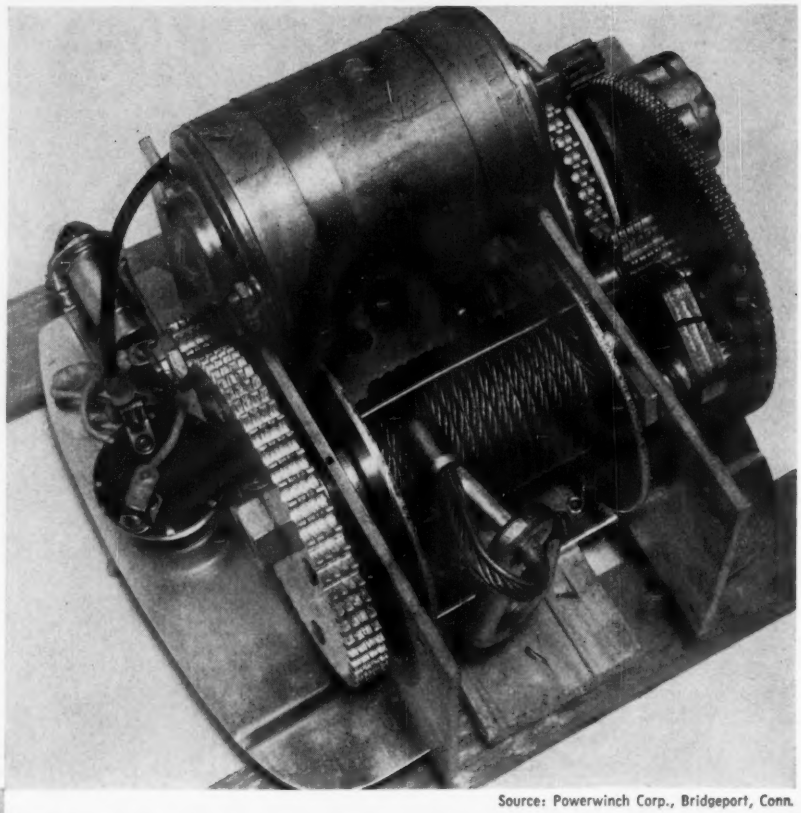
• The firm has a special jig to hold parts while they're fastened.

The company began using its tightening principle on small meter movements. Nuts are placed by hand in cups on the ends of driveshafts leading to the tightening motors. After the meter movement is in place, screws are held with hex head wrenches while the motor turns the nuts.

Pressing a pedal starts both motors simultaneously. The control may be used with any size motors. A simple device may be added to minimize the effects of starting current surges.

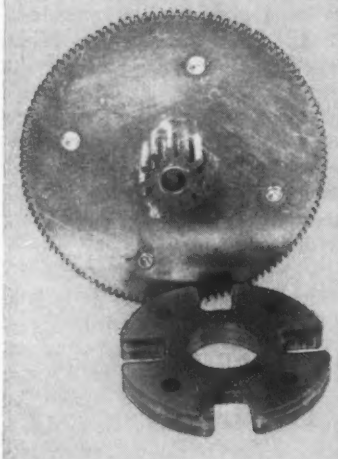
Stacked Stampings Pile Up Savings

By CARTER C. HIGGINS
President
Worcester Pressed Steel Co.
Worcester, Mass.



Source: Powerwinch Corp., Bridgeport, Conn.

Power winch illustrates unusual combinations of stacked stampings for gear train and pawl. Device is used to haul small boats on trailers



Ratchet (bottom) is made from two pieces spotwelded and shaved to size. End product is said to be better than single stamping it replaced. Reduction gear is staked to shaft. Large gear is riveted

Method is being used to make a variety of parts, including gears, cams, and levers. Author cites several case histories and describes some basic rules that are involved

GEARS, cams, levers, pawls, even pole pieces for electric motors, can be made cheaply and quickly from stacks of stampings.

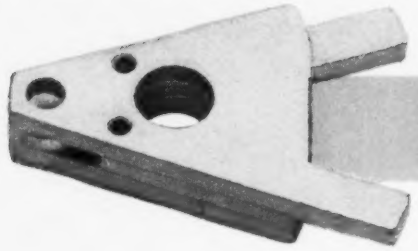
Experience has proved to us many times the advantages of seeing individual parts as groups of metal slices. Here are a few:

- You can combine several materials in one piece to benefit from multiple properties. (Soft cores, hard surfaces, for example.)
- You can increase or decrease strength, dimension, or wearing surface by adding or subtracting layers.
- You can make heavy duty parts on light equipment.
- You can build up variations by adding blanks with lips, grooves, or pins.

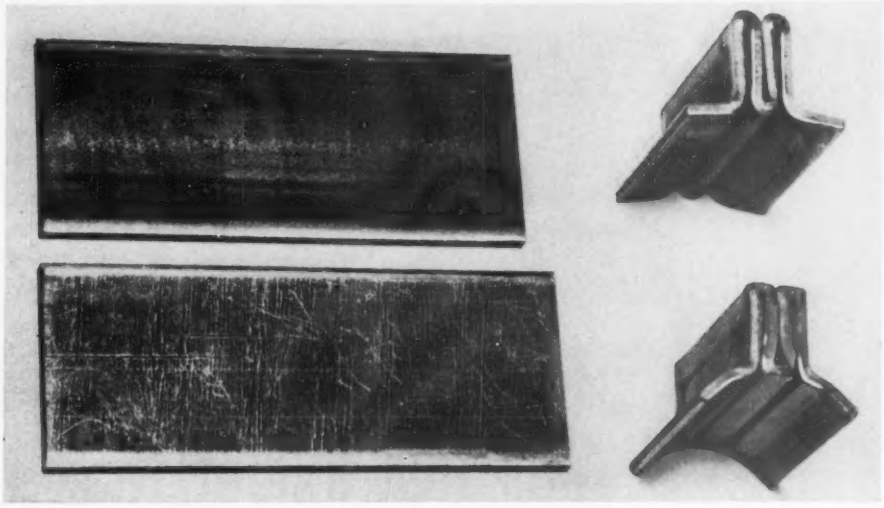
• Success with the technique depends on the imagination and experience of designers. A few basic examples illustrate what can be done.

One of the pictures (left) shows a ratchet wheel below a small pinion gear fastened to a large disc. It could have been hogged out of a bar at great expense, or it might have been stamped out of ½ in. hot rolled steel. But the points would have pulled down badly, and the working edges might have 0.020 in. of breakout (my dentist calls it malocclusion). The solution: Two, ¼ in. stampings, shaved and spotwelded together.

Such an approach has real meaning for gearmakers. It takes a solid tool to cut teeth in heavy metal,



This switch finger is an example of the variety gained from putting three different blanks together. A solid piece this size would have to be milled



Pole pieces are folded variation of stacking principle. Tooling is more expensive, but it eliminated an extruded piece. Savings for Delco people ran 70 per cent

but in thin material, a light tool can give you delicate shapes. You then stack the pieces and add lightening holes if you wish. (Once the punches are paid for, they add nothing to the part cost.)

Layers of stacked stampings don't have to be identical if the job will stand the cost of another blanking tool.

Suppose you have to mill the edge of a piece pretty deeply. It is a simple operation to cut a layer smaller to get the groove.

The same is true of a counterbore for a socket head screw. Punch the top couple of layers with a larger hole than the lower one. For blind holes, you simply pull the punch out.

Twisting some of the motor laminations slightly will provide an internal curved passage. A slot in one layer gives a groove, not round, perhaps, but serviceable. Keyways are no trouble.

The outer layers can incorporate all sorts of stops and lance-formed projections for attachments. It is much cheaper to bend sheet metal at an angle than to carve out projections. Bending a second layer up through a slot is the answer for a no-radius stop.

Another idea: Small toothed stampings staked to a "D" shaft to turn a large gear made from laminates. Pawls can be made the same way.

• Here's a prize winning example. The technique was used to make pole pieces for an electric servomotor, replacing bar stock.

A folded piece of stock became four layers with well located grooves for designer Wilbur Carlson, Delco Appliance Div., General Motors Corp., Detroit. It won the redesign award from the Pressed Metal Institute, Cleveland. Savings: 70 per cent.

• You may choose from several methods of joining. The wrong joining method can eat up any profit you may have gained in adopting stamping.

In general, it is cheaper to stamp blanks from thick material—one or two thick stampings are cheaper than several thin ones. Consider press capacity, edge roughness, tolerances.

The cheapest way is not to join layers at all but to rely on wires and keyed or flattened shafts or assembly bolts. If you are afraid of twisting or separating the layers, put in lanced projections or locating buttons in holes. An edge tab folded into a notch will get results at little extra cost.

Spotwelding is practical and inexpensive. It is usually done on stacks less than $\frac{5}{8}$ in. thick unless you have a large welder. Narrow sections sometimes can't tolerate weld nuggets—consider projection welding.

Riveting can be cheaper than welding in some cases, unless heads must be countersunk. Parts don't have to be as clean. Rivets can be

used for heavy sections, too, and holes can be punched while blanking. Staking is like riveting, the rivet often being a tab from a lower layer.

Although the tool charge goes up, folding layers back on themselves is a satisfactory method of joining layers. Lining up notches, holes, and bosses may not be quite as precise as using separate layers, but you can qualify them later.

You may also consider laying down an arcwelded bead to tie up the edges—you may even conceal the bead in a notch.

• Layers can be insulated from each other with adhesives.

Some electrical requirements make it necessary to separate each layer with an insulating bond. Some of the newer adhesives do an excellent job; others require fussy techniques. The bonds are good up to 500° F.

If you want a homogeneous mass, use silver solder for small parts or copper brazing for larger ones.

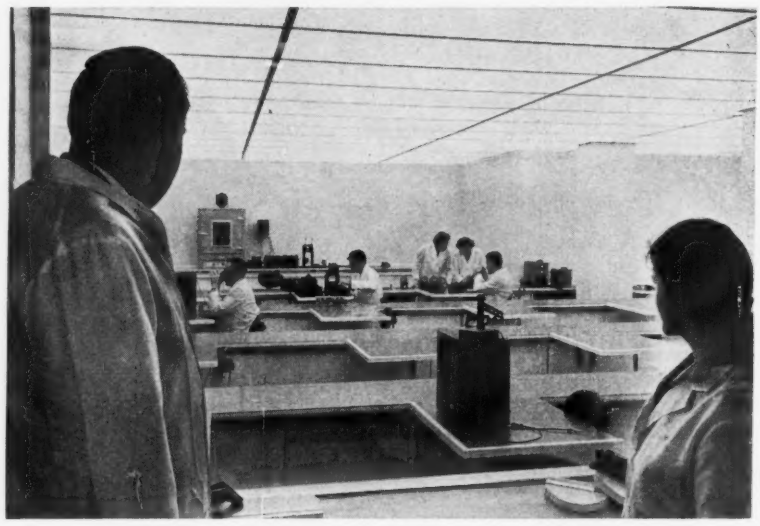
• Some points to consider in designing stacked stampings: Other than the regular problem of stamping parts, you should consider quantity, sheet material specifications, tolerances, and edge conditions.

Such operations as turning or milling edges, grinding stacks (to remove cumulative error caused by layer thickness variances), reaming, and tapping are not stamping, so they add to the cost.

Designers must also take care to check hole depths and groove widths when they affect the gage of layers. They should also strive to keep gage variety at a minimum to simplify purchasing and save with quantity "extras."

Flatness is seldom a major problem. On larger stacks, tolerances could accumulate to a fairly large size. Certainly, stock gets no flatter in presses. When my customers call for tolerances up to 0.001 in. per inch of length, I feel that it's a gamble at best without additional operations.

Two precautions: Avoid welding freckle-sized pieces onto base plates; some designers have a tendency to call for more precision than is practical.



Greater ease of seeing is responsible for faster production of small instruments at Cleveland company. General Electric says lights are best available

How Improved Lighting Aids Instrument Maker

Reduced eyestrain and worker fatigue bring quick improvement to quality and costs. Impressed with results, the firm will relight another room four times larger

IMPROVED LIGHTING boosted quality 100 per cent, increased production at least 50 per cent, and shaved costs 20 per cent at Hickok Electric Instrument Co., Cleveland.

The lighting level in an instrument assembly room was increased from 100 foot candles to 300. "To see potential defects in the old room, we had to rely on jewelers' magnifiers. Now we only use them for a final inspection," says Paul Radecky, production supervisor.

• Better lighting enables inspectors to see problems quickly and easily.

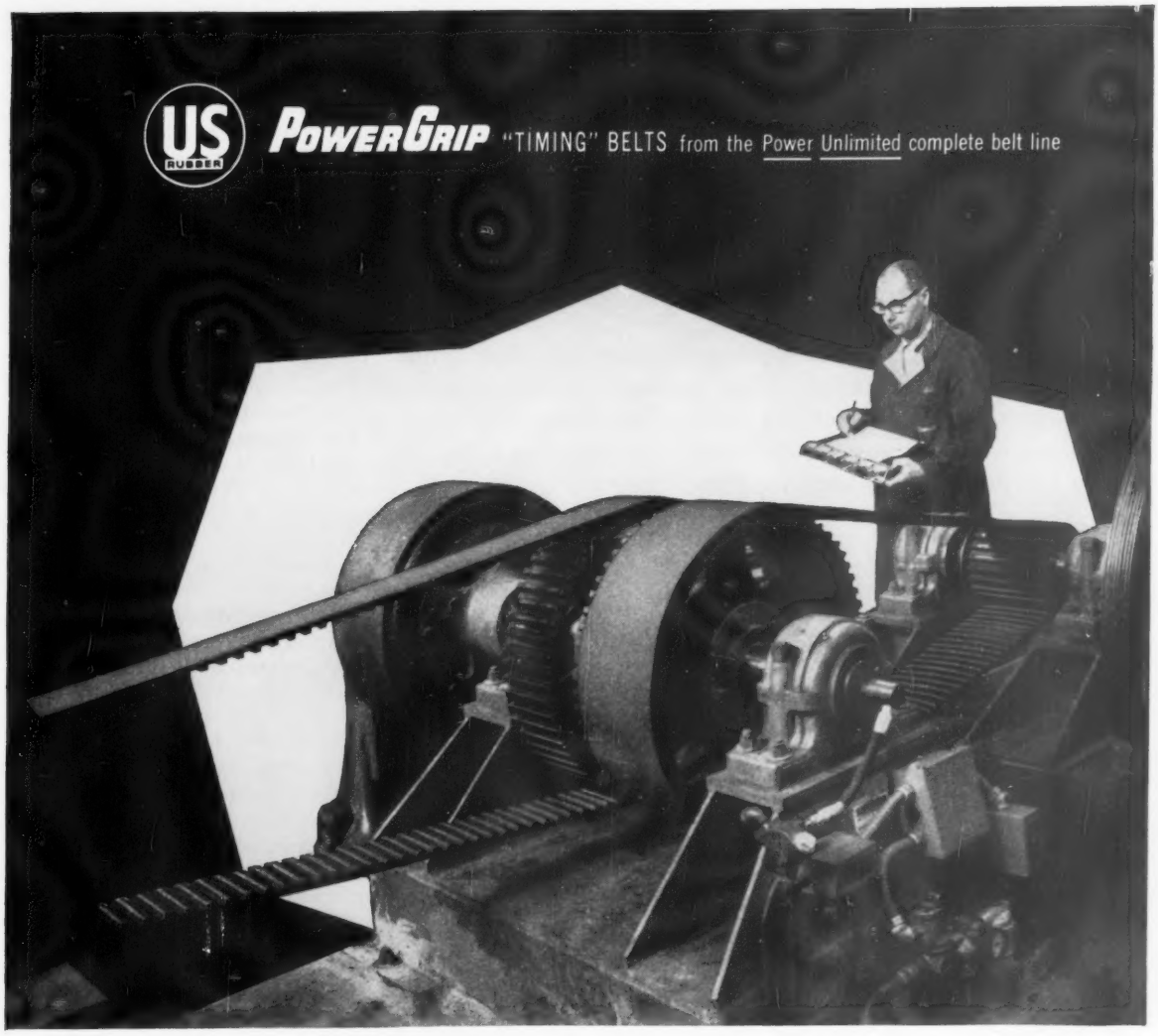
At one stage of production, a meter couldn't pass a rigid electronic test. Careful examination failed to reveal the defect. Taken into the newly illuminated white room, inspectors easily located the trouble—a small hair was jamming the mechanism. Similar incidents have practically been eliminated.

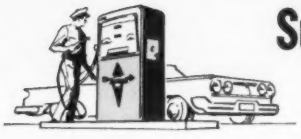
• The room is pressurized and has a luminous ceiling.

Hickok makes meters for critical jobs in aircraft, missiles, and space vehicles—one contains more than 200 watchlike parts. Its white room is air conditioned, dustfree, lintless. Personnel must wear special garments. They brush their clothing with magnetic brooms, wipe their feet on magnetic floor mats.

Temperature controlled air inside the room is 4 psi higher than that outside. The luminous ceiling is equipped with continuous rows of two lamp, 8 ft fluorescents above a vinyl plastic ceiling material. In determining reflecting surfaces, General Electric lighting engineers figure 70 per cent are walls, 20 per cent bench tops, and 10 per cent floors.

Hickok says it will install similar lighting in a room four times larger at Greenwood, Miss.





Sun Oil Company obtains positive results with U.S. PowerGrip "Timing" Belts

The octane requirements for cars are determined by the Sun Oil Company with scientific accuracy. The octane ratings of motor fuels are in turn determined with precision. Nothing is left to chance. This is why the motorist can pull up at a Sunoco station and obtain the correct octane blend for his car.

All of this predetermination is done on precision equipment whose universal joint drive shaft is connected to a dynamometer by a 1¼" pitch U. S. Rubber PowerGrip "Timing"® Belt. In the words of a company scientist, these belts were selected because they give foolproof, positive drive transmission and do not require lubrication, maintenance or attention. Anything less would interfere with the precision of the testing equipment. This is the experience that has caused innumerable design engineers to specify PowerGrip.

This is the belt that has made possible the development and production of hundreds of appliances and equipment, ranging from sensitive electronic devices, office machinery, household equipment and gigantic production machinery. One way to get expert and instant power and transmission advice is from the U. S. Distributor.

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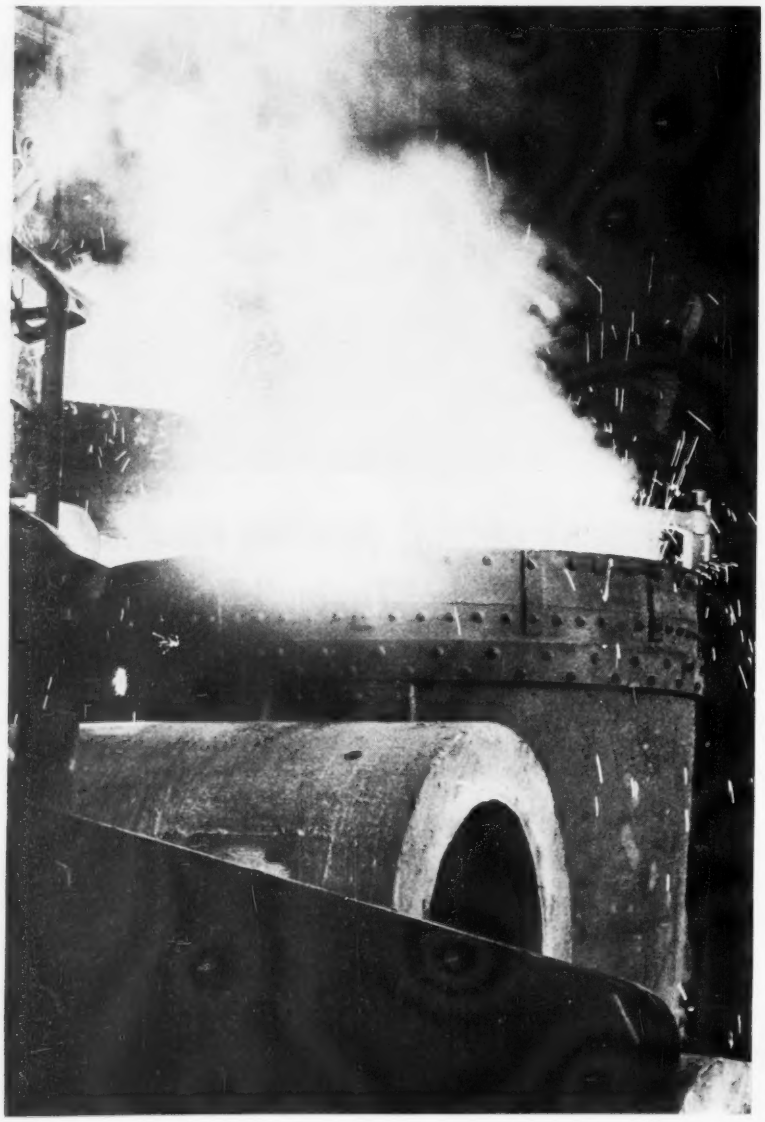
Pouring Practice Changes Evaluated Ultrasonically

Method permits testing of complete heats of steel from Heppenstall's open hearths. It has led to increased tapping temperatures and ladle holding times, abandonment of pouring boxes and silicon carbide ladle additions, and use of higher refractory ladle well toppings



SEVERAL CHANGES in pouring practice, adopted after product evaluation with ultrasonic testing equipment at Heppenstall Co., Pittsburgh, have helped the company meet a growing demand for cleaner steels, says A. C. Mager, general foreman, Open Hearth Dept.

Progress being made in determining the origin and nature of irregularities that caused acid open hearth steel to be rejected or questioned at Heppenstall was reported by Mr. Mager at a meeting of the National Open Hearth Steel Committee and the Blast Furnace, Coke Oven & Raw Materials Committee, American Institute of Mining, Metallurgical & Petroleum Engineers (AIME), in Chicago.

• Several test methods were used in an attempt to evaluate certain open hearth practices.

Incidence of sonic indications in the company's products was relatively high in 1956 and became higher in 1957. Consequently, some accepted open hearth practices were questioned.

Vacuum immersion samples were taken from the furnace at various stages on several heats to determine the degree of cleanliness in the furnace. Microscopic examination indicated that steel in the furnace was clean and that inclusions causing sonic indications must be of external origin.

Ladle test molds were used to take samples from the furnace and at various positions in the pour, to determine the origin of the inclusions. Test ingots were reduced in cross section to eliminate inherent porosity. Macroscopic and microscopic examinations followed. Inclusion indications were few and inconsistent, and no conclusion could be reached; the method was abandoned.

• The stepdown test method was tried (and later abandoned) in an attempt to determine the effect of a change in deoxidation practice.

All heats were scheduled so a 17 in. Gathmann ingot, weighing 6000 lb, was poured first and used as a pilot. The bottom section of each ingot was forged to a 10 in. diameter and a 30 in. length, then step machined in 1 in. increments, 4 in. long, to a final 5 in. diameter. The surface of the stepdown sections was then subjected to a magnetic particle

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If you don't buy now . . . You'll pay later

You can bank on it. If you don't buy new production equipment now, you *surely* will pay later, and the price will be high in more ways than one.

The recent Machine Tool Exposition in Chicago demonstrated beyond a doubt that production economics *and* production techniques are undergoing rapid and sweeping changes.

As a result, production management is faced by two big jobs, 1.) Deciding *which* items of new, advanced equipment are best suited to individual plant requirements, and 2.) convincing top management that this new equipment *must* be acquired, and that it can be paid for easily in a way best suited to your needs.

Jones & Lamson can help you with this twofold problem. First, the new J&L line of machines is broad in application over a great variety of operations. Second, these machines will pay for themselves out of Profitivity®, and can be leased at an hourly rate of $2.50 per $20,000 of machine value: There's no advance payment, and the hourly rate drops to 12½¢ after five years.

Literature telling about the machines, how to justify their purchase, and how to pay for them, is yours for the asking.

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test. Only one discontinuity was observed in 14 ingots, and the procedure was discontinued.

Some production pieces were rejected because of ultrasonic indications. They were sectioned, and inclusions were extracted electrolytically. Spectrographic analysis indicated that the inclusions were of a slag or refractory nature.

• Experience indicated that the entire heat would have to be tested for proper evaluation. That prompted the use of the ultrasonic reflectoscope.

In the reflectoscope, ultrasonic techniques are employed in a pulsed, echo ranging system. Short bursts of ultrasonic vibrational waves, introduced into the material under test, travel in a straight line.

Discontinuities, such as inclusions, porosity, or flakes, cause part of the waves to be reflected back toward their source. The reflected energy is converted into electrical impulses, and total travel time through the material is measured; the interval is proportional to the distance from the entrant surface.

Energy also returns from the opposite side of the material. That surface is used as a reference to tell the total thickness of the part being tested. Indications are displayed on a cathode ray tube screen.

• It was felt that changes in open hearth procedure could be evaluated by observing their effect on die block products.

All die block products made by the company are sonic tested. The reflectoscope is calibrated with a standard test block of material similar to the block under test. The 12 by 3 by 3 in. block has a 3/16 in., flat bottom hole drilled 2 in. deep in one end. Amplification of the reflectoscope is tuned on the test block, so the size of indications is compatible with the depth of penetration of the part under test.

Die blocks are questioned when the instrument indications are 3/16 in. or greater (if the indications are not isolated); if a reduction of 50 per cent or more in back reflection is noted; or if concentrated indications under 3/16 in. are noted—even without a decrease in back reflection. Blocks are questioned in the absence of indications and sharp decrease or complete loss of back reflection. Surface imperfections more than 1/16 in. deep, determined ultrasonically or visually, are also cause for questioning material.

• Changes were made in open hearth procedure; their effect on cleanliness was evaluated by graphing the percentage of questioned blocks.

Tapping temperatures were increased 75° F and ladle holding times were boosted 33 per cent in an attempt to bring inclusions to the top of the ladle. Use of silicon carbide as a ladle addition was discontinued; it was felt that late additions, such as those made in the ladle, may cause more nonmetallics to be retained.

Pour boxes were eliminated, and direct teeming was adopted. Ladles were cleaned by removing all adhering slag. It was thought that slag in the pour box lining and the ladle were a source of nonmetallics.

Procedure changes reduced the percentage of questioned material substantially. The percentage of questioned blocks dropped from 21.5 per cent in March, 1958, to 8.2 per cent in September of the same year.

• All blocks of a particular analysis were studied carefully for effects of pouring variables.

The company's most common chrome-molybdenum-vanadium die block analysis was selected for study. (Other steel analyses were checked, but less thoroughly.)

Each ingot of the material was stamped with a number indicating its pour position and its heat number. The Forge Dept. supplied a sketch that pinpointed the position of each block in the ingot. The Ultrasonic Inspection Dept. reported its findings on each block. Such procedures permitted the entire volume of each heat to be examined.

• Slag or refractory nature of extracted inclusions indicated that the ladle condition might affect cleanliness.

Sixty-seven heats were studied to determine the effect of fully conditioned, partially conditioned, and unconditioned ladles. The fully conditioned ladles were cleaned completely with an air hammer; slag was removed down to the refractory face. In the partially conditioned ladles, all heavy or protruding slag was removed with an air hammer, but smooth, tight slag coating was allowed to remain. Unconditioned ladles were cleaned with bars; only large particles of adhering slag were removed. Refractory characteristics of ladle wells were similar for the three types of ladles used.

Best results were obtained with the unconditioned ladle—a questioned percentage of five. Effectiveness of the air hammer for removal of certain slag particles wasn't questioned, but the hammer is thought to break loose other particles of slag or refractory, which would be more harmful than the original slag.

• Incomplete melting of steel wool caused the company to discontinue use of pouring pads.

Direct pour teeming was causing unusually short mold and stool life. It also increased conditioning time, because of bottom splash. Steel wool pouring pads were used in the bottom of the ingot molds to damp the force of the molten stream. The pads were used for 21 heats; microscopic examination of sections containing sonic indications revealed stringers of oxide type inclusions.

The practice was discontinued because of incomplete melting of steel wool and a 500 per cent increase in the incidence of sonic indications.

• Higher temperature refractory ladle well toppings were tried and adopted.

The ladle well, because of its proximity in the ladle, is subjected to high temperatures and mechanical erosion. It was felt that home generated ganister and fire clay, used as well material, were inadequate as refractories.

Four ladle well materials were evaluated during the pouring of 118 heats in unconditioned ladles. Materials other than ganister and fire clay were used only as a topping material — areas not exposed to molten metal were filled with ganister and fire clay, then topped with the higher refractory material.

Topping was rammed to a 2 in. thickness. Materials were evaluated on the basis of the amount of questioned material in each heat. Conclusion: Increasing the amount of alumina in the topping material was said to reduce the percentage of questioned material in the heat.

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Completely automatic turret lathe gives peak production efficiency

J & L's new, completely automatic turret lathe sets a new high standard of efficiency for both bar and chuck work. Now, for the first time, you have the versatility of turret lathe tooling combined with completely automatic operation. All machine functions and sequences are pre-selected and programmed by the operator or set-up man, from a staging panel during initial set-up.

The automatic machine characteristics of this new lathe include fast motion, variable speed selection, spindle speed selection, turret indexing, coolant on and off, bar feed, and cycle stop.

A noteworthy feature is the automatic operation of a 12-speed hydraulic clutch headstock combined with a 24″ saddle motion which is actuated by a closed-loop, two-stage hydraulic servo system.

The cross slide has a 14½″ stroke and drive similar to that of the saddle, and has several automatic cycles, as programmed from the staging panel. Three speed ranges are available: 20 to 1000; 30 to 1500; and 40 to 2000 RPM. Power is from a single speed motor (up to 40 HP). Feed range is from .750″ per minute to 30″ per minute for the saddle, and from .375″ per minute to 15″ per minute for the cross slide.

Send now for our folder on this remarkable new machine. Jones & Lamson Machine Company, 517 Clinton Street, Springfield, Vt.

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Pressure Welds Cut Railroad Costs

Leased system joins rails more efficiently than former bolted joints, claims welding firm. Part of savings is attributed to lower maintenance costs

A NEW rail welding system speeds welding time and cuts manpower requirements 40 per cent.

The equipment was developed by Linde Co., a division of Union Carbide Corp. (Its Oxweld Railroad Dept. has been machine welding rails since 1938.)

A 1957 survey by the American Railway Engineering Association shows that the average railroad saves $981 per track mile by using continuous welded rails rather than the bolted type. Most of the savings come from lower maintenance costs. Linde Co.'s new welding system also decreases installation costs.

• The equipment has been undergoing field tests at the Soo Line's rail welding site in Fond du Lac, Wis. It makes handling and welding of rails a pushbutton process.

After a rail is loaded onto a storage rack that feeds the production line, it is automatically controlled until it is placed on a train for its journey to the laying point.

An automatic rail handling car selects a rail from the rack, holds it until needed, then deposits it in place on the line. The empty car then shuttles back to the rail rack and selects the next rail. Sensing devices tell the car when and where new rail is needed.

A power roll advances the rail along the production line to an idler lift roll which is controlled by the operator of the end finishing machine. There is another idler lift roll beyond the end finisher. Working together, the rolls compensate for the camber of a rail through air pressure devices.

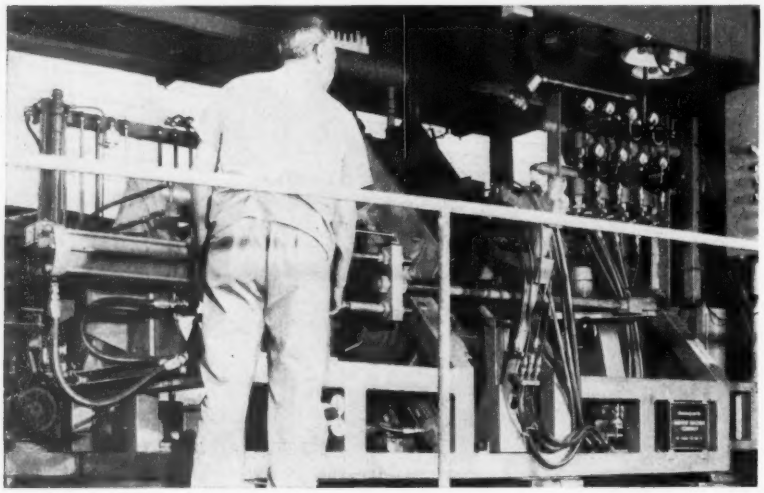
In the end finisher, a moving abrasive belt grinder squares the rail end; the rail is advanced; and the other end of the rail is ground square.

An idler roll advances the rail to the welding machine. Butted against the trailing end of the previously welded rail, the two ends are aligned by a series of dies, clamped, and a pressure of 3000 psi applied. An oxyacetylene head surrounding the rail ends heats them to a plastic state and the pressure fuses them together.

The continuous length of rail is automatically advanced to the grinding machine by a pinch roller. In one operation, the excess upset metal around the joint is removed from the ball, base, and web of the rail.

A normalizing operation on the welded joint follows, and the rail continues through the inspection station and onto the cars of the rail train.

At the Soo Line's welding site in Fond du Lac, the equipment is housed in boxcars owned by the railroad. Linde Co. leases the welding system to railroads. Linde also has contract welding sites at Harrisburg, Pa., and Birmingham, where the equipment is permanently installed.



Operator watches semiautomatic heating of rail ends by oxyacetylene torches. At proper temperature, pressure fuses the rail end. Grinder (below) removes hot upset metal formed during fusion

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MACHINE TOOLS

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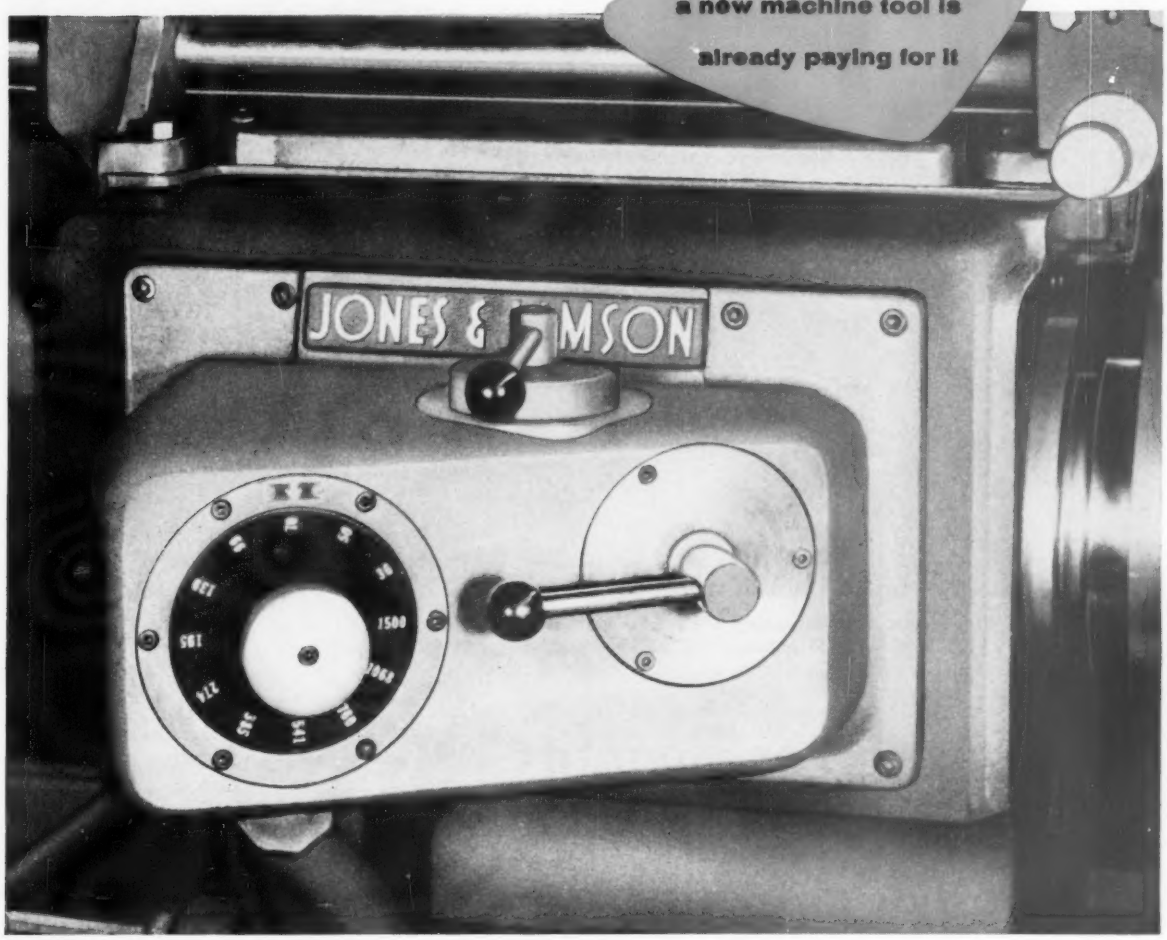

New improved design for J & L Ram and Saddle Type Turret Lathes

These two new J & L lathes are *really* new. No mere face lifting here . . . both lathes have been completely redesigned from the floor up!

Both the Ram type and Saddle type lathes are equipped with a multi-speed hydraulic headstock, and are capable of giving you more chips per tool, more pieces per hour, and more profit per job.

The redesign of these machines starts with 41″ of leg depth for more stable footing. New cross-ribbed bed design provides even greater rigidity for heavy cuts — and gives straight-line chip disposal out the back. The new wide pan includes a built-in accessible coolant tank at the head end of the machine. The new headstock transmits up to 40 HP.

An extremely important feature is the hydraulically operated clutches, which change pre-selected spindle speeds instantly and automatically.

Other features include: motor mounted vertically on the rear of the machine; a new carriage of rugged design, on which the stop spool is more conveniently located; heavy duty aprons which allow the adaptation of full length lead screw threading attachments, as well as the extremely versatile 2-Dimension (180°) carriage tracer; built-in independent pumps, which supply forced lubrication to the aprons, carriage, and saddle.

Both of these new lathes offer more power, greater accuracy, and easier operation. Write today for details. Jones & Lamson Machine Company, 517 Clinton Street, Springfield, Vt.

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Technician Alan Braun runs chemical analysis on a General Electric spectrometer at Rosedale foundry. In less than 20 minutes, the device analyzes metals which used to take 8 hours in a lab

X-ray Analyzer Benefits Foundry Three Ways

PROBLEM: Cut analysis time, improve quality of nonferrous castings for military applications.

SOLUTION: An x-ray spectrometer.

Analyses which formerly required 8 hours can now be completed in less than 20 minutes, says Herman Kistner, president, Rosedale Foundry Corp., Hicksville, N. Y.

That gives melters plenty of time to make adjustments in heat composition before pouring.

Results: Improved control of analysis and no rejects due to off-specification heats.

• An x-ray spectrometer throws a strong beam of x-rays against solids, liquids, or powders which emit a series of secondary x-rays which can be individually identified.

To make a qualitative analysis, secondary x-rays radiated by the various elements within a sample are gathered and channeled (collimated) to pass through an analyzing crystal. The various wave lengths are divided or separated into individual sections by the crystal.

It acts as a three dimensional diffraction grating.

An operator rotates the crystal (the device is called a spectrogoniometer), producing peaks on a chart or graph. Each series of peaks is slightly different from the other. Each identifies a particular element.

To make a quantitative analysis, the operator presets the spectrogoniometer and measures the amount of x-rays being given off by the sample at that setting. Since intensity is directly proportional to concentration, a simple calibrated chart permits plotting intensity against quantity.

• An attachment permits the foundry to conduct its own research to improve metallurgical techniques and the properties of the products it sells.

Alan Braun, technician at Rosedale, points out that the General Electric spectrometer he uses can be converted into a diffractometer in only 10 minutes. It enables him to identify compounds formed before and after heat treatment within a metal sample.

For example, magnesium silicide greatly affects physical properties of aluminum castings. Diffraction patterns formed by that compound before and after heat treatment permit precise measurement of how soluble it is. By measuring changes in solubility caused by various modifications of composition, Mr. Braun can do his own research to improve the foundry's product.

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OPTICAL COMPARATORS

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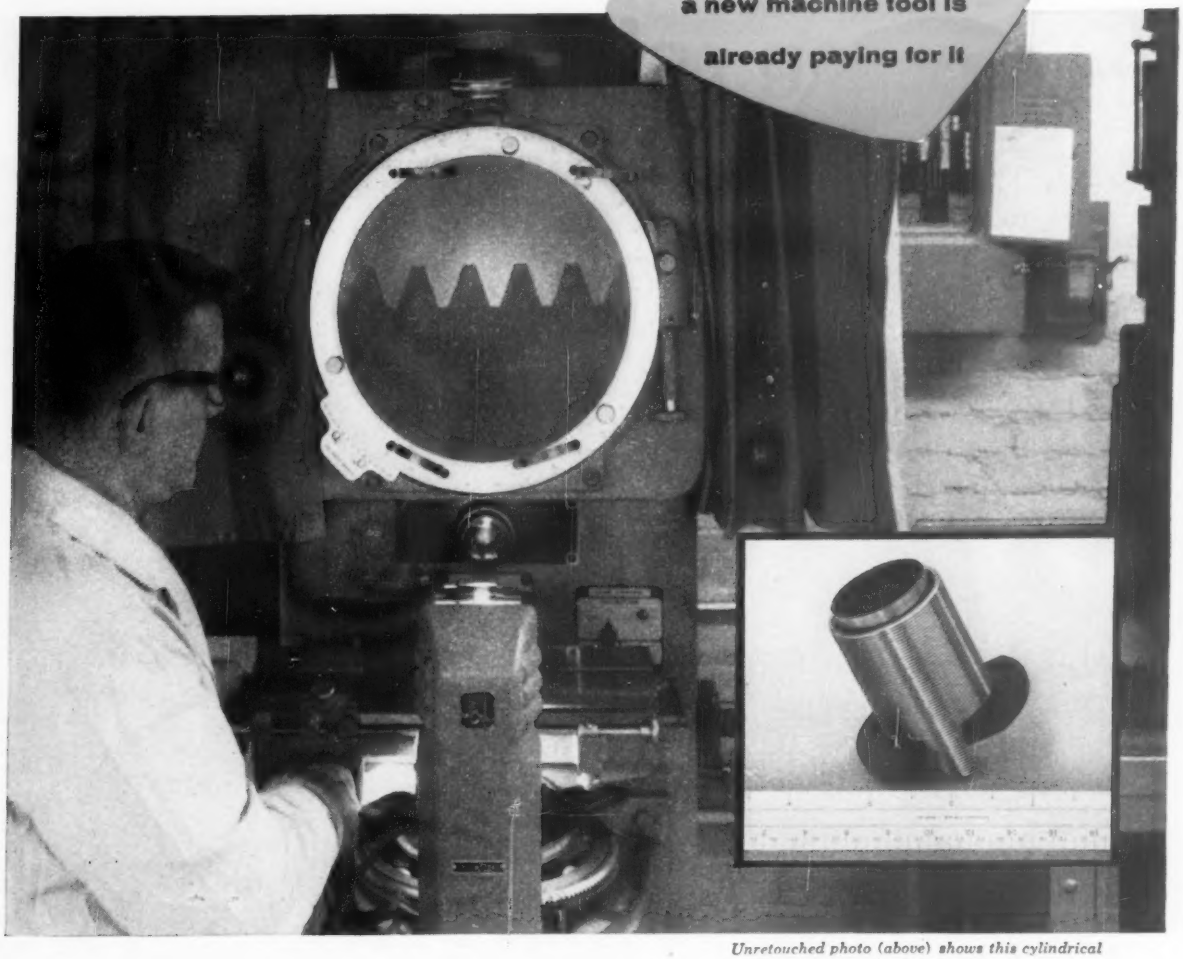

Unretouched photo (above) shows this cylindrical rack being inspected at 62.25X. Photo, courtesy of Baird-Atomic Inc., Cambridge, Mass.

4000% Increase in Inspection Efficiency through use of a J & L Optical Comparator

Baird-Atomic, Inc., Cambridge, Mass., manufacturer of scientific and research instruments needed a rapid and precise method for the quality control measurement and inspection of various components. After experimentation with various types of inspection equipment, a J & L FC–14 Optical Comparator was given a trial. It met all requirements perfectly.

The inspection of a cylindrical rack, heart of the Baird-Atomic Periscopic Sextant, used in advanced aircraft, gives an illustration of the J & L Comparator's efficiency.

The rigid quality control tolerances for this part include: tooth-to-tooth tolerance, .0002″; tooth-to-tooth error, .0003″; composite error, .0003″; pitch dia. within .0005″; concentricity within .0005″ TIR.

Adequate inspection and measurement by conventional methods proved laborious and time-consuming: inspection rate was little better than one rack per day. Now, using a J & L FC–14 Optical Comparator, average inspection rate is 42 per day, an increase of approximately 4000%!

Investigate the possibilities of J & L Comparators in *your* production set-up. Available in 12 different models, both floor and table types.

Write today for Comparator Catalog 5700. Jones & Lamson Machine Company, 517 Clinton Street, Springfield, Vermont.

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"Now get immediate
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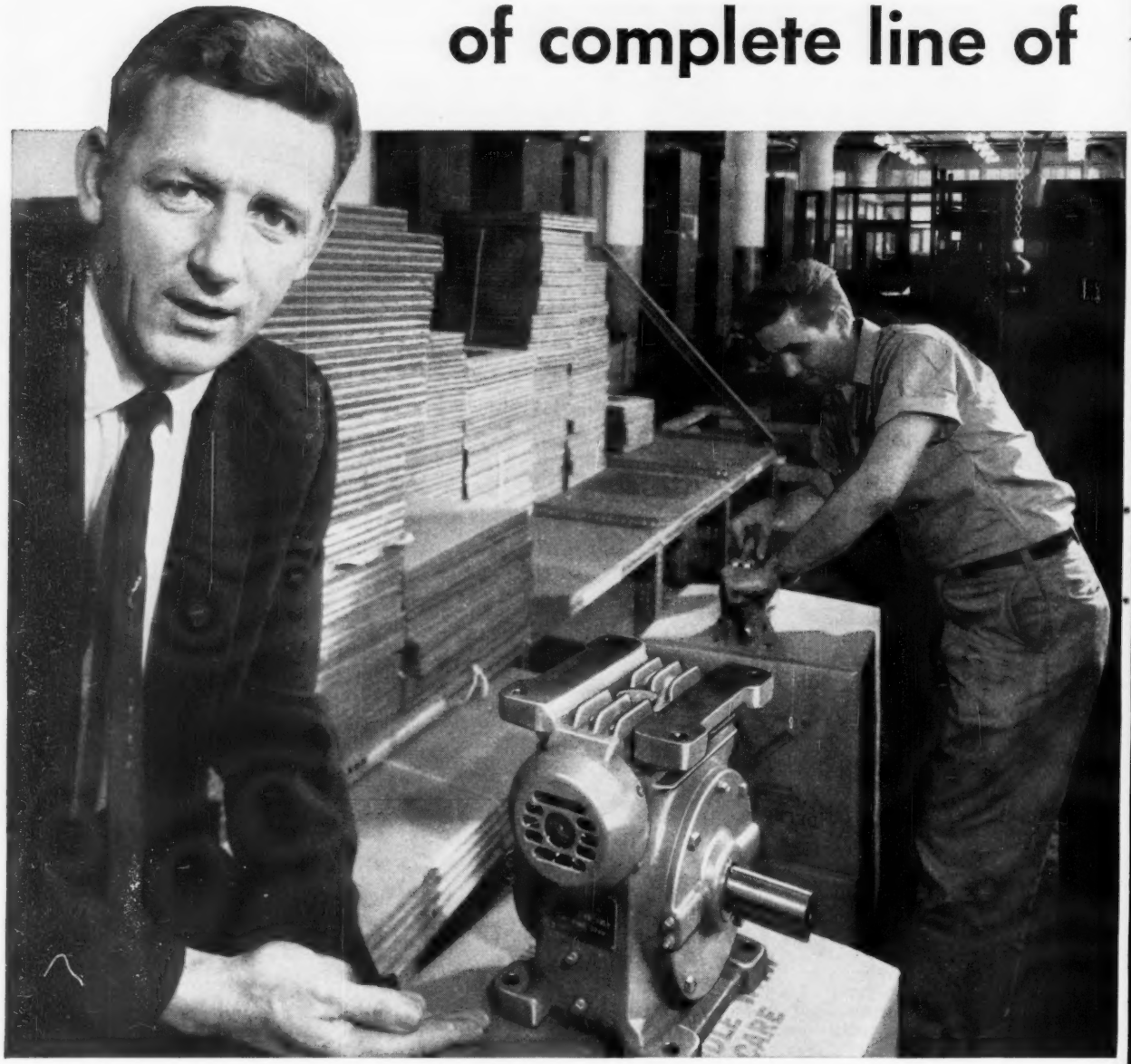
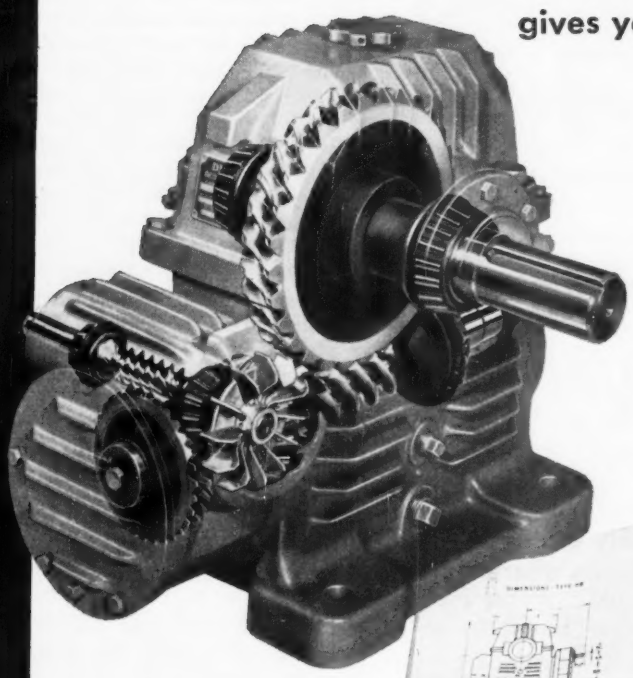


A. T. Gallagher, Manufacturing Superintendent, Delroyd Worm Gearing.

"Here's a shot of our Delroyd Verso worm gear — one of hundreds being boxed and made ready for shipment. Unlike most speed reducers, this Verso unit can be mounted in any position — horizontal, vertical, upside down. • "This is but one model in a complete line of Delroyd worm gear reducers — with the widest range of horsepowers and sizes in the industry."*

*1⅛" center distance, fractional horsepowers — to 12" center distance, 152 horsepower. Reducers to 36" center distance with horsepower capacities to 700 are supplied as standard. Larger units to meet any requirement can be supplied on special orders.

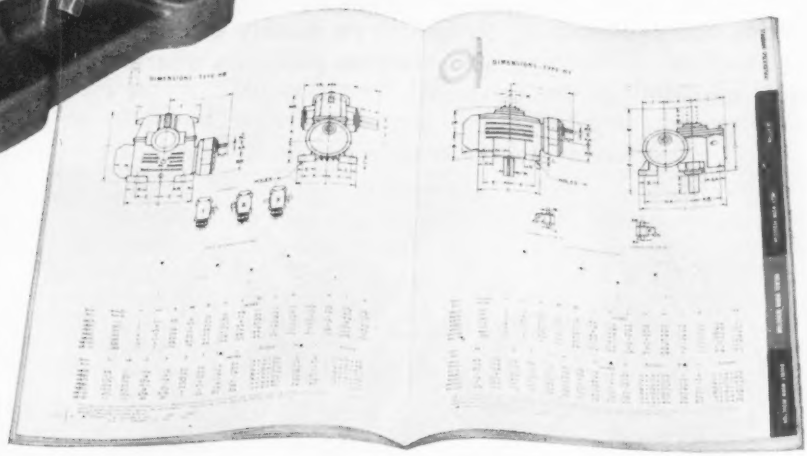
delivery
DELROYD worm gearing..."



DELROYD worm gearing
gives you these superior design features:

- Exclusive involute helicoid thread form for highest load capacities
- Centrifugally cast bronze gear for increased mechanical ratings
- Fan cooled finned housings for higher thermal ratings
- Lower weight per horsepower
- More horsepower per dollar

NEW full color 84-page Delroyd Catalog:



Now available — the worm gear industry's newest, most complete catalog. Contains all basic design and application data, selection charts, ratings and service factors — plus illustrations in full color. For your free copy, write on your company letterhead to: Delroyd Worm Gearing, De Laval Steam Turbine Company, Trenton, New Jersey.

DE LAVAL **STEAM TURBINE COMPANY**
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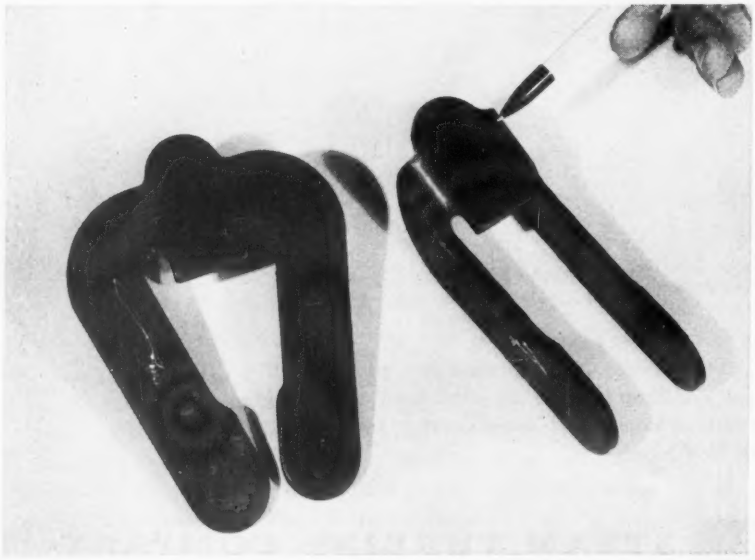
DL-210

. . . . "our laboratory has enabled us to keep the division in business and to turn it from a loss into a profit," says W. P. Clark, Wall Colmonoy president

Metals Laboratory Helps Job Shop Win Work

Lab functions include: 1. Recommendation of initial work cycles and procedures. 2. Checks on quality control during production. 3. Helping with customer problems where materials and designs don't match



Striker plate blank and formed part. Use of the laboratory eliminated cracking

A DIVISION doing bright annealing and copper brazing boosted sales 56 per cent by using the parent company's lab facilities as a sales tool.

By offering potential customers complete case studies and analysis of their jobs, Wallco Div., Wall Colmonoy Corp. (Detroit) was able to suggest improved work methods and anticipate problems. The division now contributes almost 20 per cent of the company's annual net income.

Two years ago, the division was barely breaking even in sales. It competed with half a dozen similar job shops in the area. Sales had seldom done more than pay the overhead since the division opened its doors in 1952. "We faced a point where we either were going to close it up or make something out of it," says W. P. Clark, Wall Colmonoy president.

• Practice includes running all jobs through the laboratory first.

Explains Howard Jenkins, Wallco plant manager: "Now when a job comes in, we know the metallurgical properties of what we're working on, so we can quickly decide whether we can do the job, how we can do it best, what kind of results we'll get, and when we can deliver. That has improved divisional cost control and helped us make more realistic quotes."

• The lab has been the avenue to more business because the division can now operate as an adviser and a troubleshooter instead of being only a job shop.

Mr. Jenkins cites an example: "An auto supplier sent us samples of a striker plate for a deck lid lock. The plate was being annealed in another shop, but when the factory tried to form it into finished shape, rejects ran higher than 50 per cent because the plates cracked during forming.

"The supplier turned the part over to us to see if we could come up with an annealing method that would cure the breakage. Our lab went in and asked the usual three questions: 1. 'What is the material?' 2. 'What does the customer want to do with the product?' 3. 'What other heat treat operations will following forming?' "

The part had been designed for

SAE 1035 carbon steel. Lab analysis quickly showed that the material did meet those specifications—and the mill annealing specifications as well. Samples were already in the fully annealed condition, but the material wasn't ductile enough to keep from cracking under the severe draw needed to form it.

If Wallco had been an ordinary jobbing shop, it would have had no recourse except trial and error to see if it could get the proper kind of annealing cycle. The lab soon discovered the problem could be cured by controlled surface decarbonization in an exothermic atmosphere. Enough ductility was provided so parts could be formed easily, but after forming, it was necessary to restore the carbon to bring the parts back to required strength and wear limits.

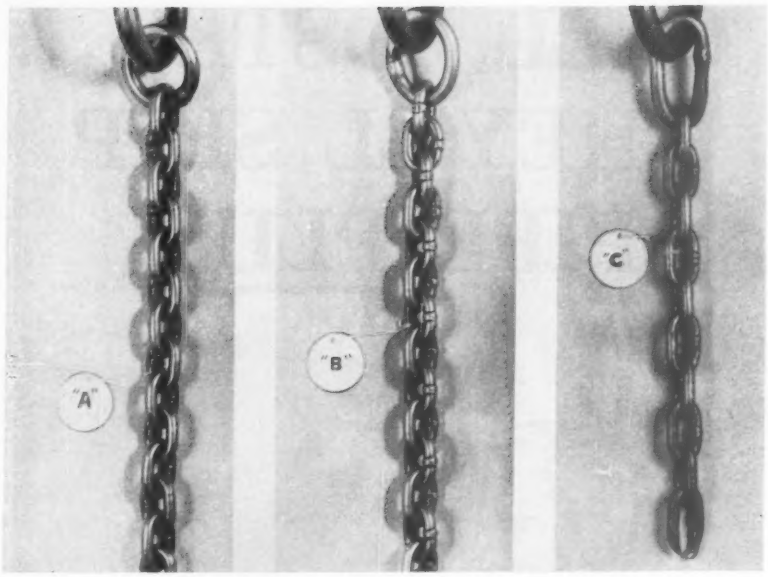
Checking revealed that the automaker had scheduled a heat treatment of the formed part as a regular production process. The method lent itself readily to the introduction of a carbon restoration cycle which could be done simultaneously with the heat treatment and with only a slight increase in processing costs. With that knowledge, Wallco won the job. It took the carbon out, and the carmaker restored it.

Says Mr. Clark: "This may be common to big industry, but it's unusual in the kind of jobbing operation we have. As far as I'm concerned, our laboratory has enabled us to keep the division in business and to turn it from a loss into a profit."

Ladle Additions Feeders To Be Used in L-D Shop

Basic oxygen steelmaking at the Cleveland Works of Jones & Laughlin Steel Corp. will feature ladle addition of ferroalloys in specific quantities and at controlled rates, with feeders designed by Blaw-Knox Co., Pittsburgh.

The feeders are being built for close quarters operations at Jones & Laughlin's two new oxygen vessels, expected to be in operation early in 1961. Used previously in open hearth steelmaking, the feeders are said to provide greater additive recovery and better ingot quality at lower cost.



Sling labeled "A" has not been overloaded. "B" shows a slight ring elongation, a first indication of excessive loading. "C" shows extreme elongation with the sheared chain demonstrating strength of the ring

Warning Ring Signals Sling Chain Overloads

It's used with alloy chains that don't have the ductility of conventional types. In most instances, only the warning ring has to be replaced after chain is overloaded

A WARNING ring that elongates when overloaded has been incorporated into a sling chain called the Sentry Sling (made by Campbell Chain Co., York, Pa.).

The ring combines superior ductility with strength beyond the alloy chain itself. Workmen can see the elongation signal of overloading before there is any danger of chain failure. A yellow band on the ring helps to identify it.

New rings can be obtained through Campbell's normal repair service. In most cases, only the elongated ring must be replaced.

• Campbell Chain says the warning ring answers a safety need that came with the trend to light, strong alloy chains which carry heavier loads.

The alloy chain provides better handling, but without the ductility of conventional materials.

Warning devices aren't needed for conventional slings because elongation from overloading runs as high as 50 per cent and is clearly visible by workmen. Alloy chain elongates only about 15 per cent under overloads.

• Before marketing, in-plant tests were conducted in foundries and steel mills in the East and Midwest.

The tryout period lasted two years. Tests in one foundry showed that sling chains with warning rings were still in good condition after nine months of service. Average life for test units without the rings was about 16 weeks, says Charles F. Feiser of Campbell Chain.

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Spotwelding of Aluminum Improved

INCREASED production, labor and equipment savings, and improved product appearance are said to be advantages of an MIG spotwelding process adapted for aluminum fabrication.

The process, sometimes called metallurgical riveting, is a form of consumable electrode, inert gas shielded, metal arcwelding. It was initially developed for steel. Olin Mathieson Chemical Corp. (New York) says the refinement gives consistent results with aluminum.

• **One operator can make 12 spotwelds a minute.**

Such operations as punching members to be joined and lining up holes are unnecessary. No cleaning of the base metal is required. The welds are made from one side. The other side is left smooth.

• **The welds have good fatigue properties, and corrosion resistance is equal to that of the parent metal.**

There is no distortion of the base metal. Tests by Olin Mathieson show high strength in properly made MIG spotwelds. Compact, portable equipment can be obtained from several manufacturers.

Limitations: The process can't be used with material less than 0.030 in. thick. When unequal thicknesses are joined, the welds must be made from the thinner, or lighter gage material to the heavier gage. MIG spotwelds cannot yet be used to join high strength, heat treatable aluminum alloys in the 2000 and 7000 Series.

• **Weldmaking**—A gun (hand drill size) maintains a direct current, reverse polarity arc between an aluminum wire electrode and the workpiece in an argon atmosphere. The gas is confined in a small cup attached to the end of the gun and held against the metal to be joined.

When the trigger is depressed, a series of relays and timers establishes the arc and maintains it long enough to fuse the two members together (about ½ to 1 second, depending on the thickness of the aluminum members being joined and the type of joint).

Cutting Fluid Doesn't Stain Aluminum or Brass

DIFFICULTIES in heavy broaching, reaming, threading, and tapping can be overcome. The maker of a cutting fluid and coolant called Trim H. D. claims its product will do the trick. Low viscosity allows fine chips to settle rapidly and prevents them from wedging between the relief of the tap and the work, it says.

The material, a white jell, is diluted with water. It will not stain brass or aluminum.

For further information, *write* Master Chemical Corp., 11 N. Huron St., Toledo, Ohio.

Production Machine Has Building Block Design

EIGHT, standardized, basic components form the nucleus of a building block, machine tool design. Standardization applies to the mounting and attaching surfaces, bolting patterns, bolt sizes, location method, and uniform workloading height.

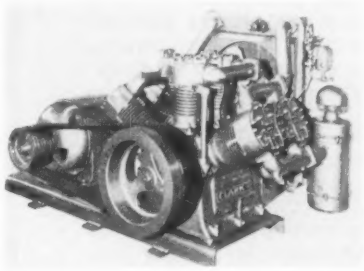
The machines can be built as single or multiple station units for drilling, boring, reaming, tapping, and related operations.

For further information, *write* LaSalle Machine Tool Inc., 21535 Hoover Rd., Warren, Mich.

Two Stage Compressors Designed for Durability

COMPACTNESS, durability, and efficiency are featured in a line of 100 lb air compressors in the 25 to 100 hp range. The two stage air cooled units, called the C-Line, are air cooled. They are light, and easy to install and maintain, says the company.

W-type construction is used to shorten crankshaft and compressor length to minimize floor space needs. The compressor can be bolted directly to a concrete floor or mounted on a relatively thin concrete slab. A constant speed load and unload device is standard equipment. For intermittent operation, an optional dual control permits start-stop duty for the motor and the compressor,



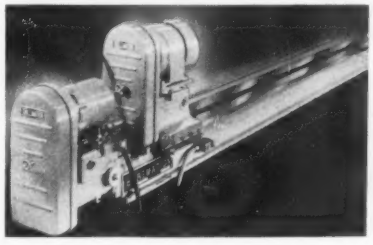
or it may be set for continuous motor operation and free air compressor unloading. The C-Line compressors are available as a basic compressor, base mounted compressor without motor, or a complete base mounted package including motor drive.

For further information, *write* Clark Bros. Co., Olean, N. Y.

Gun Drilling, Boring Unit Makes 60 in. Long Holes

GUN DRILLING of holes up to 60 in. long and 3 in. in diameter can be done by a heavy duty gun drilling and boring power unit called the Boremation "Sixty." The holes can be gun drilled from the solid in one pass (on a production schedule). Such operations as pilot drilling, reaming, and honing can be eliminated, says the company.

Infinitely variable feed rates are produced by a positive drive, mechanical transmission. The feed rate is adjustable from 0.0001 in. per revolution to a maximum of 30 in. per minute. Spindle speeds are



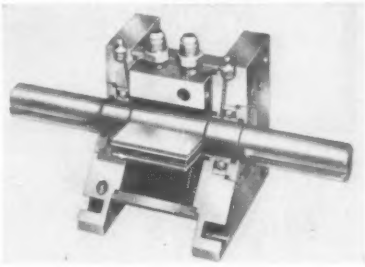
variable up to 10,000 rpm and can be matched to any feed rate.

For further information, *write* Drillmation Co., 6500 E. 11 Mile Rd., Center Line, Mich.

Oscillating Motors Available in Two Lines

JOBS such as clamping, indexing, valving, camming, lifting, and locking can be done by pneumatic and hydraulic oscillating motors introduced by Roto-Tork (see cutaway).

The compact, efficient units are available in single vane (280 degree rotation), or double vane (100 degree rotation) types. Standard units can produce torque from 100 in.-



lb to 430,000 in.-lb. The heavy duty line is built for 2000 psi operation with a wide safety factor.

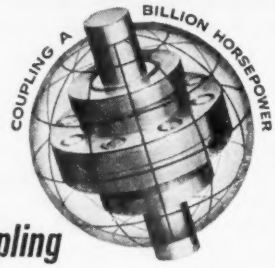
Heads are machined from cold drawn steel. The bodies come from mechanical, seamless, steel tubing honed to a 10 microinch finish. Internal surfaces are hard chrome plated to assure maximum wear life and prevent rust and corrosion.

For further information, *write* Roto-Tork Mfg. Co., 23919 Little Mack, St. Clair Shores, Mich.

Jig Borer Improvements Include Higher Accuracy

UPGRADED accuracy, greater range, and a larger table are featured in the Moore No. 1½ jig borer. The unit supersedes Model No. 1.

A three position clutch (start, indicate, and brake) is easily accessible. Other improvements in the unit include closer tolerances, in-



More equipment manufacturers choose Fast's Couplings than any other gear-type coupling

Leaving other claims aside, the thing that counts in couplings is customer confidence —and industrial equipment manufacturers have made Fast's their overwhelming choice. The Fast's line is more diversified, too—in a complete range of sizes and types for shafts, from ½" to 32" and larger.

Every Fast's Coupling brings you superb engineering only the original gear-type coupling can deliver. Smooth-running units that are designed to outlast the machines they connect. Rapid service from experienced field engineers backed by outstanding stock facilities. Write today for full details on couplings to suit your needs to: KOPPERS COMPANY, INC., Fast's Coupling Dept., 310 Scott St., Baltimore 3, Maryland.

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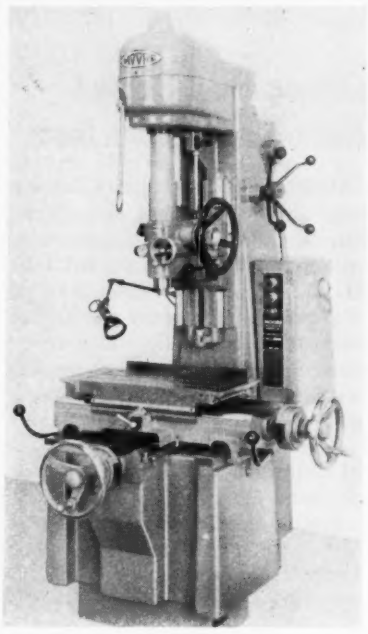


finitely variable spindle speeds from 120 to 2400 rpm, vee and flat ways, elimination of gibs and overhang, microsetting of vernier dials, and greater rigidity.

The table measures 10½ x 19½ in. The unit has two feeds (the preceding model had only one). Weight has been increased from 1700 to 2300 lb.

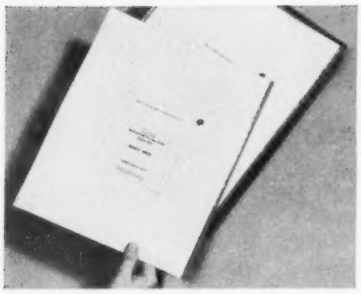
For further information, *write* Moore Special Tool Co. Inc., 800 Union Ave., Bridgeport, Conn.

Strip Rolling Mill Handles Widths to 6 in.

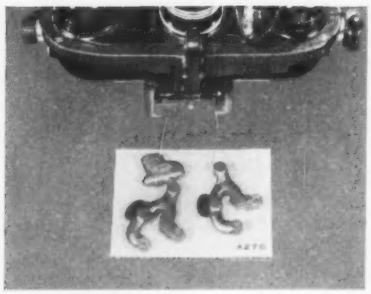
A COMPACT two high, four high, combination mill handles ferrous and nonferrous strip up to 6 in. wide at rolling speeds up to 250 ft a minute. It takes 35 sq ft of floor space.

The mill is furnished with two sizes of four high, work rolls made from alloy tool steel or tungsten carbide. The 1½ in. size is used for normal cold reduction down to 0.002 in. thickness and the ¾ in. size allows special, thin finishing to gages less than 0.001 in.

In the four high setup, the machine handles up to ⅛ in. gage. The two high arrangement is used for the hot or cold breakdown of heavier materials up to 1 in. thick,



1) No darkroom loading. Ready for exposure as it comes from the box.



2) Just place in position and expose —the film is protected from dust, dirt, light and moisture.

3) In the darkroom, pull the rip strip, remove film, and process.

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- Readily available in Type AA and Type M

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There are men like Tom Robertshaw working out of Du Pont district sales offices from coast to coast. Why not let one of them put his training and experience to work for *you?* Call the office nearest you, or write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. S-610, Wilmington 98, Delaware.

* * *

Thomas J. Robertshaw began his career with Du Pont in 1938. Following wartime Navy service as an Aircraft Finishes Specialist, he returned as Assistant to the Sales Technical Advisor in Philadelphia. In 1952 he was made responsible for Maintenance Sales in New England and upstate New York. Since 1957, he has been Central District Manager, Industrial Maintenance Sales. Among the industries for which he has solved maintenance painting problems: marine, automotive, chemical, steel, petroleum and food.

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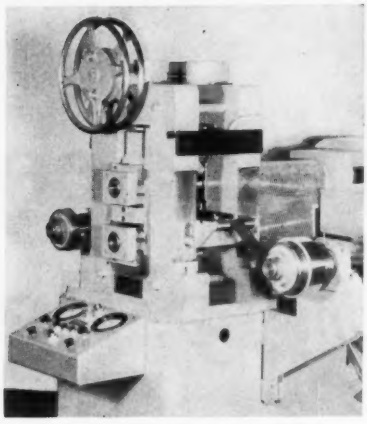


but is also available for skin pass rolling of thin strip. Work roll changes can be made by one operator within 10 minutes (a complete two high, four high changeover requires 30 minutes). A reversing strip coiling attachment allows two way rolling of strip under tension by selector switch control.

For further information, *write* Loma Machine Mfg. Co. Inc., 114 E. 32nd St., New York 16, N. Y.

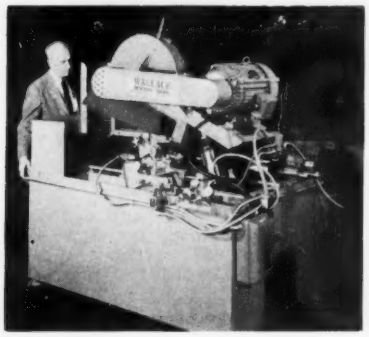
Oscillating Unit Cuts 8 x 8 in. Solid Alloy Bars

SOLID, high alloy bars up to 8 in. can be cut on the Oscilla-Modular cutting machine with profilometer readings as fine as −32. Cutting rate: 4 to 10 seconds per square inch.

An external and separate supply of coolant is pumped through a three way distributing system at rates up to 45 gallons a minute. Three chip and sediment traps are provided.

Bellows air motors with hydraulic

(*Please turn to Page* 154)



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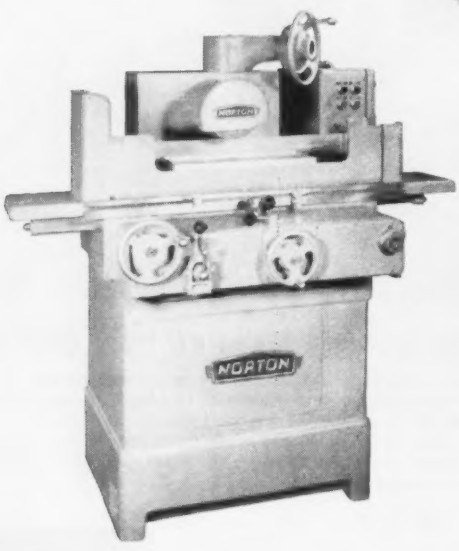
Available in 6″ x 18″ and 8″ x 24″ sizes. Both sizes are equally fast, cool, accurate on long production runs or a wide variety of toolroom grinding. Taller workpieces are easily handled by the 15″ vertical capacity of the 6″ S-3, and 13¾″ capacity of the 8″ S-3 Grinder. Other job-proved features include a two-speed .0001″ increment hand wheel, assuring accurate vertical speed and fast positioning . . . contoured splash guards, for better sighting and loading.



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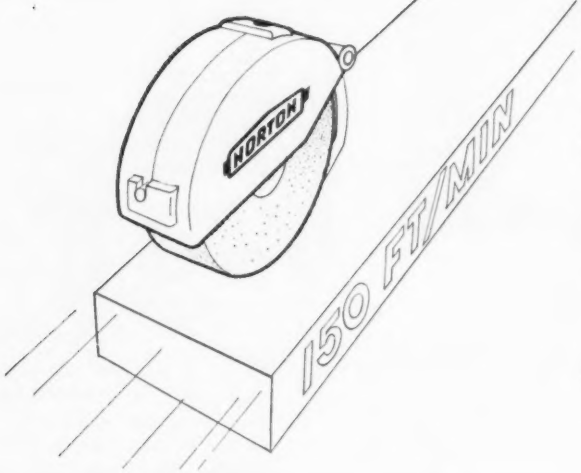

Long popular for their pace-setting table speeds up to 125 feet per minute, Norton Type S-3 surface grinders have given complete proof of their ability to finish workpieces smoother, faster, at lower cost.

Now S-3 grinders are also available with table speed stepped up to a new high of 150 feet per minute — enabling you to finish flat faster than ever, with cool-running action that saves time and money on every job.

Get the whole story from your Norton Man, a trained specialist who can help you get better grinds at lower cost. Or ask for Catalogs 1982 and 2128. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co. Ltd., Toronto 5.

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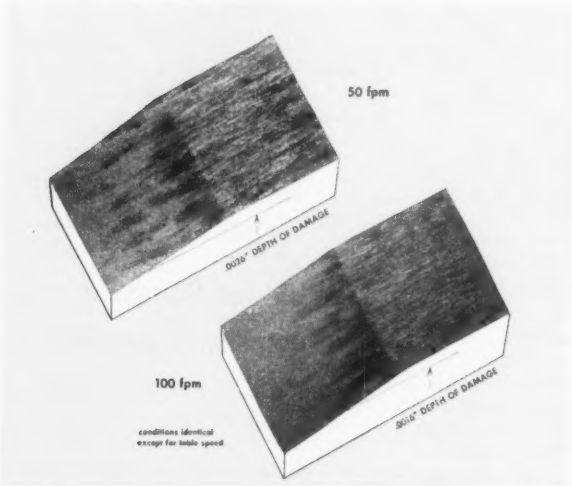
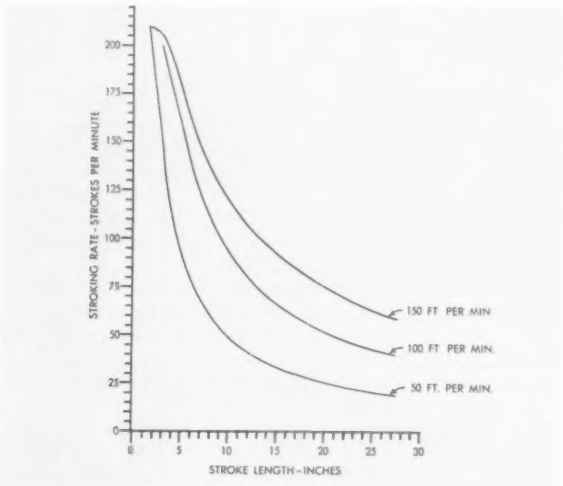


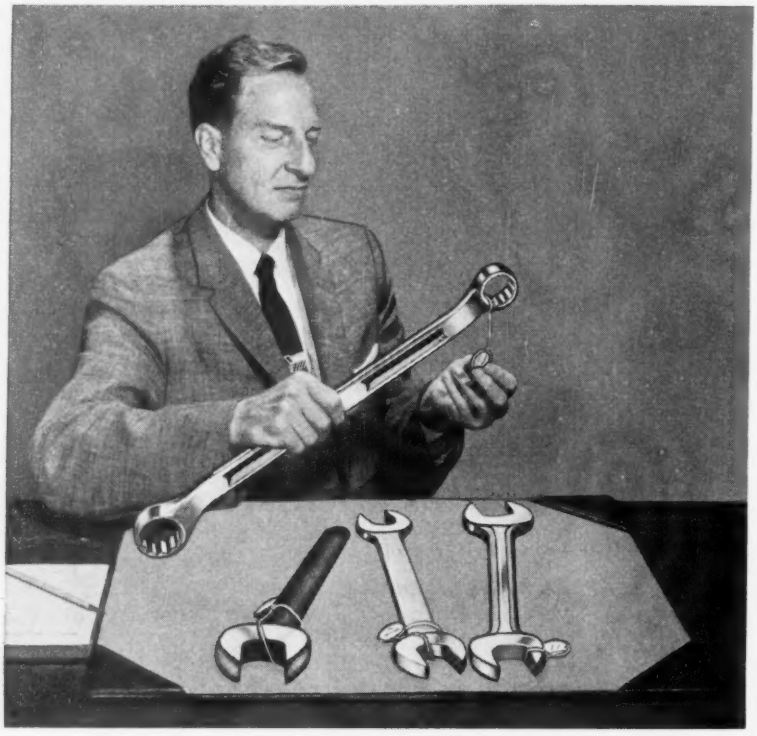
You Get Better Quality Work with Norton Type S-3 surface grinders, thanks to their faster table speeds, which reduce heat damage. The above test samples show how faster table speeds result in cooler grinding.



Calculate Your Savings from this production rate chart. Grinding time is reduced in proportion to the increase in stroking rate. The higher speeds also greatly increase the rate of stock removal.

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

In industrial wrenches...



check the price tag— check the real cost, too!

Hand tools with the lowest price tag often are the most expensive. Before you buy, consider tool life, speed of delivery, vendor's tool knowledge, worker productivity. Consider tool quality and all it implies. For example, SNAP-ON® tools are made from specially selected alloy steels that provide toughness and durability—factors that permit lightweight design. A man can work faster, easier, get more done with these tools than with clumsy heavyweights.

Forging, machining and heat-treating operations are precision-controlled. A SNAP-ON wrench fits snugly, surely — lets a man pour on the muscle power with confidence. SNAP-ON tools cost less in the long run. They stay on the job long after price-line merchandise hits the junk heap.

Delivery speed is important, too, particularly on assembly line tools. SNAP-ON maintains fully stocked regional and branch warehouses throughout the U.S. and Canada. SNAP-ON customers get immediate attention on emergency calls.

Finally, you can't put a price tag on tool knowledge and experience. SNAP-ON sales engineers are qualified to give advice on proper tool selection, plan decentralized tool cribs, analyze tool needs for maintenance and overhaul. They also refer ideas on special tools to SNAP-ON design engineers.

By every tool measure, SNAP-ON gives you your money's worth — and then some. Your nearest SNAP-ON representative would welcome the opportunity to prove this. Call him or write us now for new 180-page industrial catalog.

FOR ALL INDUSTRY

SNAP-ON TOOLS

8121-J 28th AVENUE • KENOSHA, WISCONSIN

NEW PRODUCTS and equipment

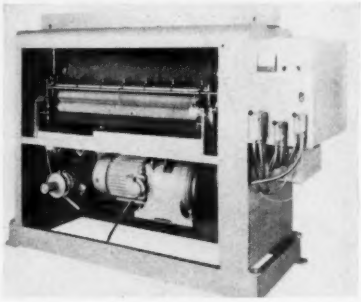
(*Concluded from Page* 151)

check provide oscillation up to 100 strokes a minute (infinitely variable). Stroke length can be adjusted from 5/8 to 6 in. You can get machines with 16, 18, 20, 26, and 34 in. wheels.

For further information, *write* Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill.

Surfacers Available for Wet or Dry Operation

SHEET surfacing work (from cleaning and preparing metals for drawing to graining and polishing) can be done on the oscillating Tri-Matic.



The machine employs abrasive, impregnated nylon on an oscillating arbor which is adjustable to oscillate from 0 to 400 times a minute. The workhead drive can be equipped for single or variable speed and the feed rolls are equipped with variable speed drive. The work pressure is positively controlled and electrically metered. You can specify units for dry or wet operation.

For further information, *write* Sales Service Mfg. Co., 2363 University Ave., St. Paul 14, Minn.

Speeds for Polishing and Buffing Heads Are Dialed

DIAL control on the Hammond polishing and buffing heads permits selection of wheel speed while the head is in operation. Various speed ranges are available.

Variable speed heads provide several advantages, says the company: 1. Wheel economy. Speed can be adjusted as wheels wear to give maximum life and production. 2. In-

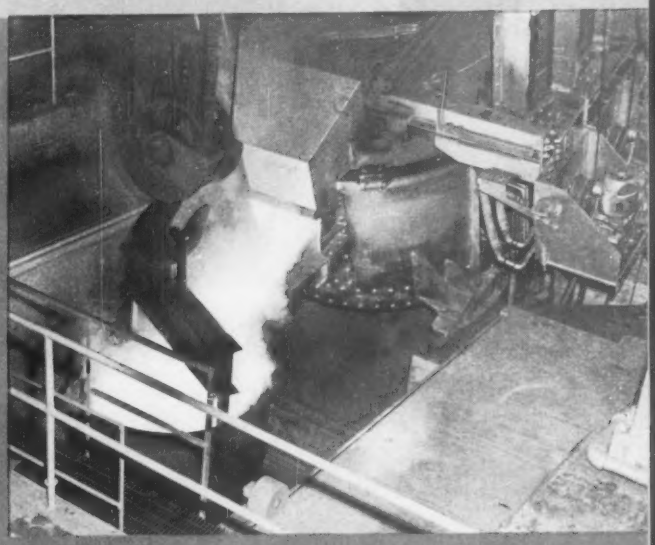
SWINDELL-DRESSLER

ONE HUNDRED AND TEN YEARS OF SERVICE TO THE METALS INDUSTRY

MANUFACTURERS

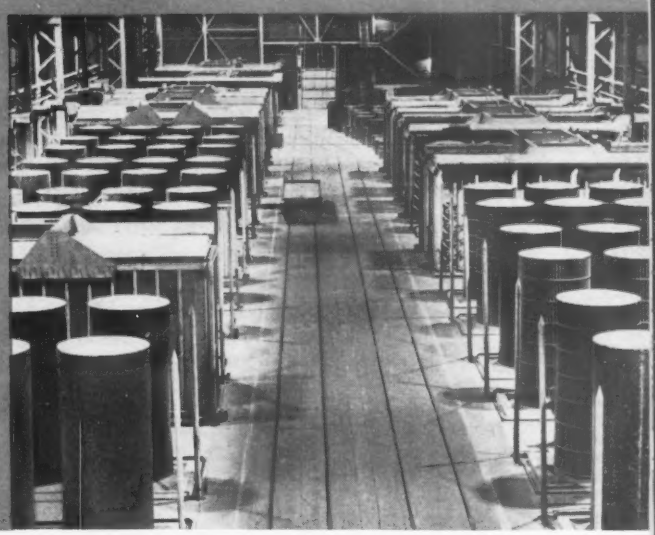
SWINDELL
ELECTRIC ARC MELTING FURNACES

Designed and built with the greatest continuity of steel-melting experience in the industry, SWINDELL Electric Arc Melting Furnaces offer the most advanced construction features for increased production rates, lower production costs, and a higher quality product. Let us match your melting requirements with the details of SWINDELL furnace performance, at your convenience.



SWINDELL
ANNEALING FURNACES

SWINDELL Annealing Furnaces in multi- or single-stack units provide complete flexibility in sheet annealing operations, with close control of temperatures. Horizontal radiant tubes and high volume convection system assure correct vertical temperature distribution, better heat application and longer life in service. We will be glad to relate the specific advantage of SWINDELL furnaces to your annealing problems, at any time.



AND ALSO: OPEN HEARTH FURNACES • SOAKING PITS • CAR BOTTOM FURNACES • MALLEABLEIZING FURNACES • HEAT TREATING FURNACES • BILLET HEATING, ROLLER HEARTH and ELEVATOR FURNACES

ENGINEERING SERVICE

Swindell-Dressler Corporation provides a complete engineering service for the steel industry in the design and construction of new plants, and modernization of existing facilities. Consultations arranged gladly on request.

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SWINDELL-DRESSLER CORPORATION

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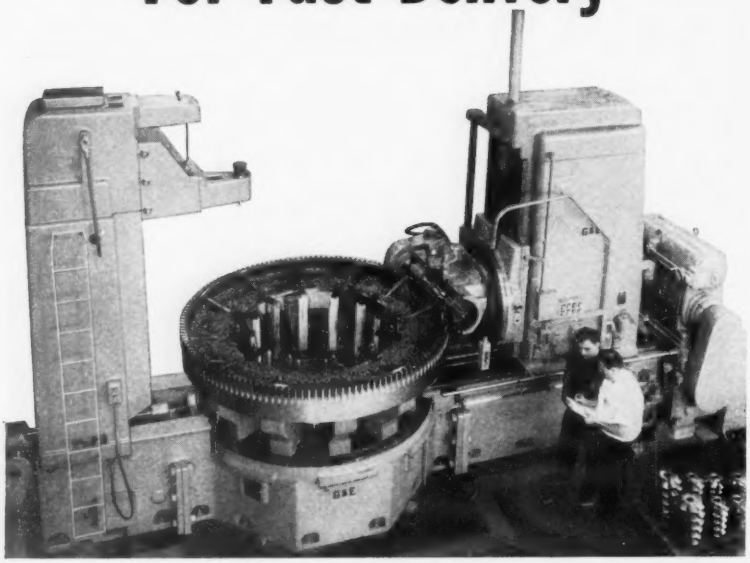
The SWINDELL-DRESSLER CORPORATION of Canada, Ltd., Ottawa, Canada

New Production Capacity For Fast Delivery



Large Generated Gears

SPUR • HERRINGBONE • HELICAL

for a wide range of industrial applications

Gears which must operate smoothly and without vibration at higher speeds and under greater loads must correspondingly be more accurate in tooth profile and spacing.

H & S Generated Gears answer these demands.

Offering the same high-quality standards which characterize the complete H & S Gear line, production capacities for large generated Spur, Helical and Hobbed-Herringbone Gears are now available in the following dimensions:

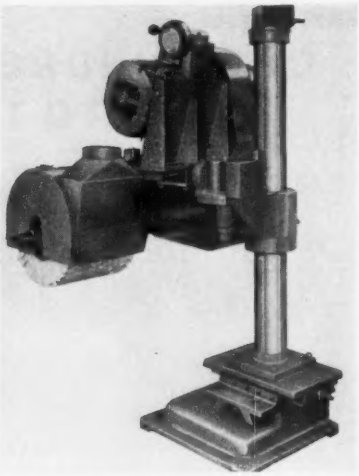
Up to 80″ outside diameter at 1 DP
Up to 90″ outside diameter at 1¼ DP
Up to 100″ outside diameter at 1½ DP
Up to 125″ outside diameter at 2 DP
Face widths up to 42″, depending on helix angle

Send your specifications, or let our technical staff make recommendations. H & S specializes in fast production of quality industrial Gearing and Speed Reducers to meet your custom requirements.

Write for Catalog FLB-60

The HORSBURGH & SCOTT CO.
5112 Hamilton Avenue • Cleveland 14, Ohio

NEW PRODUCTS and equipment



creased production. The most efficient speed can be selected without stopping the head. 3. Better finish. Speeds can be easily adjusted to requirements of different materials. 4. Convenience. The metal chart on the dial control shows the right speed for each job.

For further information, *write* Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich.

Overhead Track Switches Can Take Hard Service

TWO overhead track switches (Types K and L) are designed for hard service applications with loads from 2000 to 4000 lb. Safety, ease of operation, and long life are underscored by the maker.

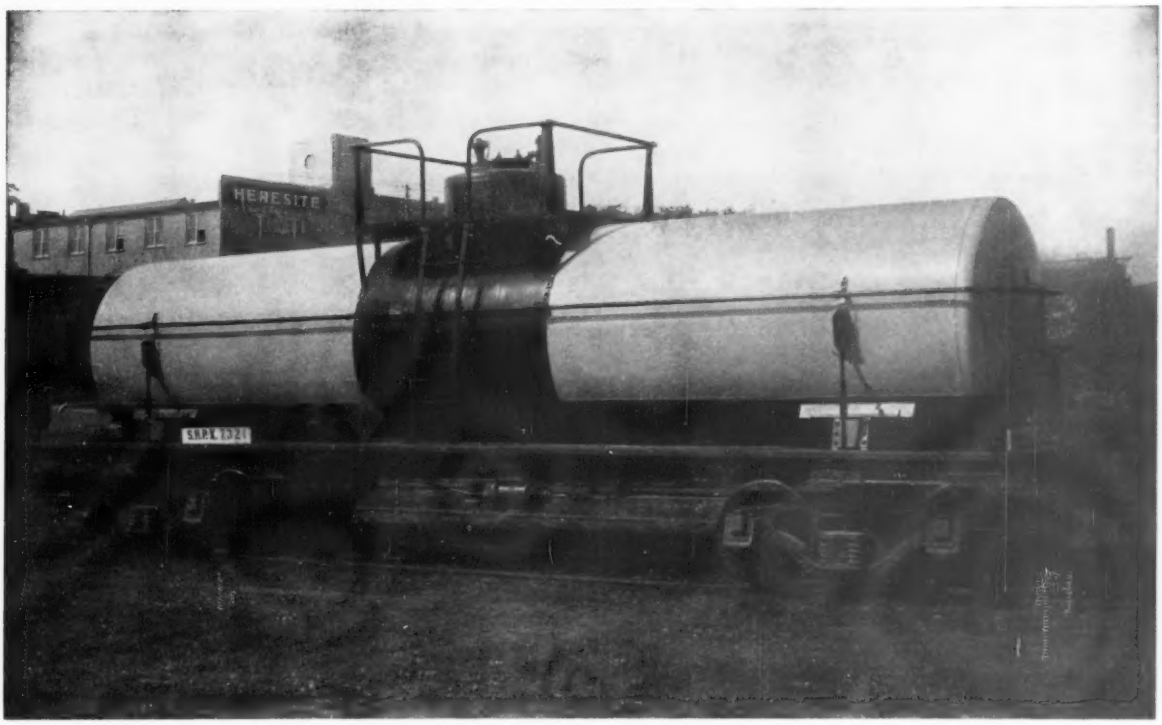
Parts subject to wear can be quickly replaced.

The switches are made for lefthand, righthand, and three way operation and for manually operated or motor propelled systems. They may be shifted by hand, electric, or air power. Safety rails are provided to

HERESITE

REG. U. S. PAT. OFFICE

TANK CARS LINED WITH HERESITE FOR HIGH RESISTANCE AND EASE OF CLEANING



Since 1947 more than 3,000 railroad tank cars have been lined with HERESITE pure phenolic resinous coatings. These tank cars were used for transportation of corrosive chemicals and the majority of them for sulphuric acid transportation. In general this coating was of a dark brown color. Now there also are light colored HERESITE coatings available for the transportation of food products. These colors are cream color, aluminum, and yellow. The colored coatings have almost the same resistance as the original HERESITE P-403 lining which is used exclusively for transportation of corrosive chemicals.

These coatings are approved for use with food products.

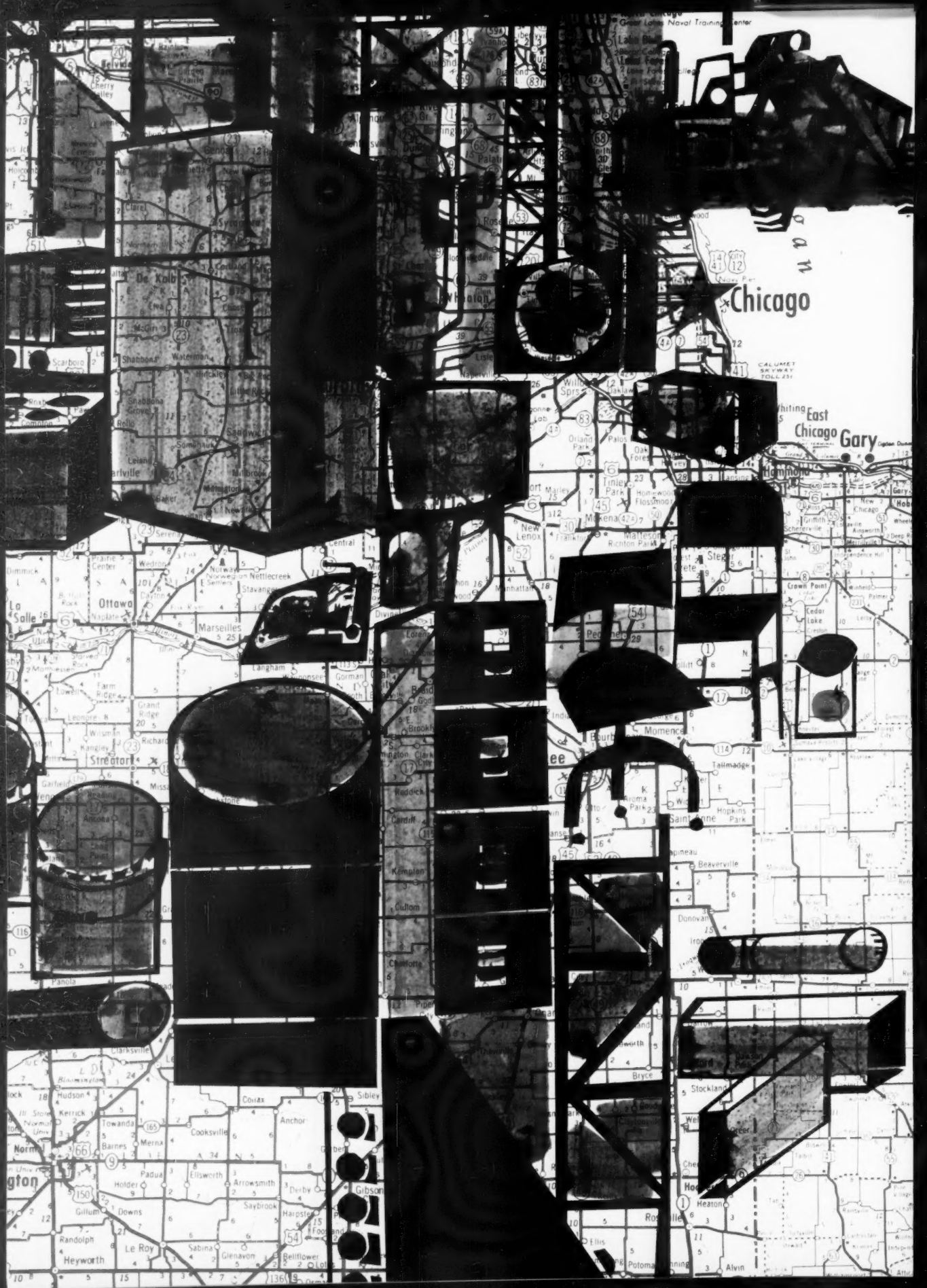
HERESITE & CHEMICAL COMPANY

Main Office & Plant—Manitowoc, Wisconsin

General Coating, Inc.—Woodbridge, New Jersey (subsidiary)

Canada: Dominion Rubber Company, Ltd.
Montreal, Quebec

Europe: Aluminium-Schweisswerk, A. G.
Schlieren-Zurich, Switzerland


Chicago
East Chicago
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Arrowsmith
Saybrook
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Gillum
Padua
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Ellsworth
Barnes
Merna
Towanda
Hudson
Kerrick
Colfax
Sibley
Clarksville
Panola
Cullom
Kempton
Cardiff
Reddick
Langham
Nettlecreek
Norway
Serena
Sheridan
Leland
Somonauk
Sandwich
Shabbona
Waterman
Shabbona Grove
Rollo
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Joliet
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Palos Park
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Tinley Park
Mokena
New Lenox
Frankfort
Manhattan
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Beecher
Crete
Monee
Park Forest
Richton Park
Matteson
Olympia Fields
Flossmoor
Homewood
Hazel Crest
Harvey
Dixmoor
Calumet City
Lansing
Thornton
Dolton
South Holland
Riverdale
Blue Island
Alsip
Worth
Palos Heights
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Tinley Park
Mokena
New Lenox
Frankfort
Manhattan
Peotone
Beecher
Crete
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Park Forest
Richton Park
Matteson
Olympia Fields
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Hazel Crest
Harvey
Dixmoor
Calumet City
Lansing
Thornton
Dolton
South Holland
Riverdale
Blue Island
Alsip
Worth
Palos Heights
Hammond
Whiting
Griffith
Schererville
Crown Point
Cedar Lake
Lowell
Hobart
Gary
Ogden Dunes
Portage
Chesterton
Valparaiso
Hebron
Kouts
Wheeler
Kingsford Heights
Hanna
Wanatah
Westville
Michigan City
La Porte
Laporte
Kingsbury
Union Mills
Rolling Prairie
Wellsboro
Kingsbury
Great Lakes Naval Training Center
Lake Bluff
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ONE OF A SERIES DEPICTING MARKET AREAS SERVED BY INLAND • ART BY BOB KEYS

INLAND STEEL IS HERE

Here, in 1893, Inland Steel was born. And here, in the world's number 1 metal-working region, Inland has unceasingly served. Poets have described Chicago and its neighboring industrial cities as a tough-muscled giant—knowing no limit to its creativity. From this area—Inland's "home" territory—girdling Lake Michigan like a crescent from the northern boundary of Illinois up through lower Michigan, come a cornucopia of products—radio and TV sets, home appliances, office furniture and equipment, heavy duty machinery, materials handling equipment, contractor's products, drums, cans, automotive parts, electrical and railroad equipment—almost every product made of steel.

And with the growth of this area, Inland has steadfastly kept pace—is today the only major steel producer headquartering in the area—one of the leading completely integrated steel companies in America—owning its own mines, quarries, ore carrier fleet—its rate of production expansion is greater than the rate of total steel production expansion for the entire nation.

Here, in Chicago, is a shining skyscraper of steel and glass—Inland's home office—hub of an enterprise now reaching out over the midwestern states from Canada to the Gulf of Mexico. Big, it has grown—big enough to meet every need of the users of steel. Yet the men at Inland, for Inland is men, are fully aware of the basis of that growth—the warm personal relationships with every Inland customer. Because Inland is here—has been here for 66 years—Inland *knows* the area—knows its technical requirements, its manufacturing methods, its people. No "in-and-outer," Inland has tried always to be of service with dependable delivery, metallurgical counsel and quality steels.

Here, also, the aim of Inland men is to be truly a part of the community—buying equipment and supplies within the area—lending a hand where they can in educational and civic enterprises—doing their utmost to provide an ever-growing service to midwestern industry.

INLAND STEEL COMPANY

30 West Monroe Street — Chicago 3, Illinois

Sales Offices: Chicago • Davenport • Detroit • Houston • Indianapolis
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Other Members of the Inland Family
Joseph T. Ryerson & Son, Inc.
Inland Steel Products Company
Inland Steel Container Company*
Inland Lime & Stone Company*
*Division

INLAND

66 years of service to the Industrial Middle West

prevent carriers from running off open ends of incoming rails.

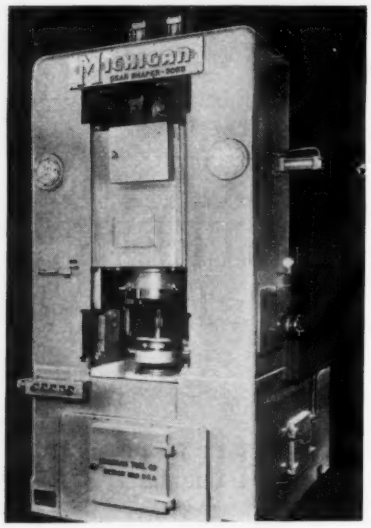
For further information, *write* Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Gear Shaper Design Aids Handling and Chip Removal

TWO models, the 3000 series, have been added to the line of Shear-Speed gear shapers. Model 3053 handles 3 to 5 in. gears and Model 3073 handles 5 to 7 in. gears.

They have the same principle of operation as the earlier 1800 series. Multiple, single point tools feed toward the center while the work reciprocates up and down to produce all teeth or forms on the contour of the work simultaneously.

Twin column construction with the integral crosshead at the top permits chip removal through the rear of the machine. Open column design also lends itself to automatic handling. Maximum interchangeability of cutter heads, fixtures, and



tooling has been maintained between the 3000 and 1800 series.

For further information, *write* Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Fine Pitch, Spur Type Gears Carried in Stock

SMALL gears ranging from 1/10 to 2¼ in. OD are available in standard sizes from 48 to 120 D.P.—10 to 40 teeth in stainless and 42 to 180 teeth in aluminum.

They're certified to be AGMA Precision Class 1 or better. All materials and protective finishes conform to federal and military specifications.

For further information, *write* Boston Gear Works, Quincy 71, Mass.

Rotary Table Indexed In Fractions of Degrees

THE Milichex rotary indexing table (Model M2X-900) is useful for inspection or machining. It eliminates gage blocks and permits unskilled operators to quickly set and reproduce any angle in increments of 15 minutes, says the company.

Extreme accuracy and simple op-

EXECUTIVE REPORT #16

HOW MANY TRIANGLES* CAN YOU FIND IN THIS STAR?

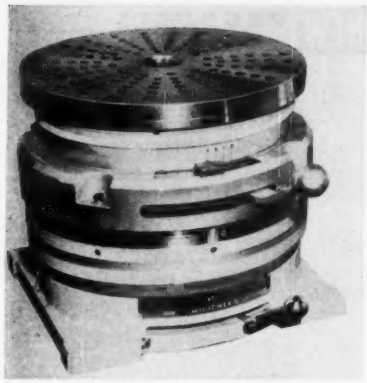
Look for the hidden value in blast cleaning abrasives, too

The "hidden values" you get in a high quality steel abrasive, like Wheelabrator Steel Shot, far outweigh any price advantage of the so-called "economy" abrasives. Wheelabrator Steel Shot is harder and tougher — lives for many more cycles through your blast equipment. It cleans better — allows shorter blast cycles. You'll get better, faster cleaning, lower maintenance, lower actual cleaning costs with top quality Wheelabrator Steel Shot. Thousands of users do. Your Wheelabrator Abrasive Engineer will prove it.

Write today for this new handbook of blast cleaning abrasive performance, full of charts and facts to help you control abrasive consumption and reduce cleaning costs. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, Wheelabrator Corp., Canadian Div., P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
STEEL ABRASIVES

If you examine it closely enough, you'll find 97 triangles.



eration is claimed for the double table construction. The lower table is a standard Model MX-3600, 360 tooth unit indexing in full degrees. Above it is a special, 96 tooth, rotary table with each tooth equal to 3 degrees 45 minutes.

Any angle in increments of 15 minutes is reproduceable by adding or subtracting one of the several multiples of 3 degrees 45 minutes (on the upper table) to the full degree setting of the lower table. The table top is 12 in. in diameter and parallel with the base to 0.000050 in. Drilled and tapped, radially dispersed holes are provided for attachment of workpieces or fixtures.

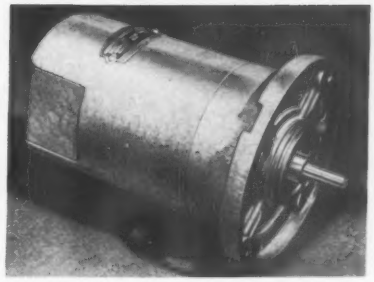
For further information, *write* Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Series Wound Motors Have ½, 1 hp Ratings

TWO 115 volt, 60 cycle, series wound motors have been designed for applications such as industrial vacuum cleaners, small winches, flexible shaft vibrators, and pipe threaders.

The two motors carry continuous duty ratings up to ½ hp at 5000 rpm and up to 1 hp at 10,000 rpm. Higher horsepower intermittent duty ratings are also available, and reversible rotation may be obtained. They're built in Robbins & Myers' frame 3736.

Ball bearing construction is used. The motors are designed for end mounting with cast iron housings and open, end to end ventilation.



Other specifications: Housing length, 7⅛ in.; mounting face diameter, 5½ in.; weight, 12½ lb.

For further information, *write* Universal Motor Div., Robbins & Myers Inc., Springfield, Ohio.

Liquid Blast Machine Can Be Bench Mounted

A LIQUID blast machine made by Hydro-Hone is designed for tool grinders, heat treaters, platers, brazers, machine shops, and electronic outfits.

The unit (designated Model 12) has a maximum air consumption of 20 cfm at 100 psi. The pump is

EXECUTIVE REPORT #28

RING PLANT WRINGS OUT MORE PRODUCTION

with Super Tumblast®

With a 14 cu. ft. Wheelabrator® Super Tumblast, Muskegon Piston Ring Co. of Sparta, Michigan, has increased cleaning room output to meet increased production.

The Super Tumblast, installed late in 1959, has averaged 150 tons of production per week, cleaning a wide variety of gray iron castings. Throwing 100% more abrasive per minute than the blast equipment previously used, the Super Tumblast cleans 800-lb. mixed loads, producing superior finishes in blast cycles of only 5½ minutes.

Maintenance through months of continuous service has been negligible. Only routine lubrication, inspection and adjustments have been required. Blade life of over 400 wheel-hours per set is a result of the high efficiency of the new CFS Separator.

IT PAYS TO REPLACE INADEQUATE EQUIPMENT

Your Wheelabrator engineer will help you analyze impartially the economics of replacing obsolete blast equipment with the unsurpassed production power of a Super Tumblast. Without obligation, write to Wheelabrator Corp., 509 S Byrkit Street, Mishawaka, Indiana. In Canada, P O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

Aiming for lower costs and precision shafting?

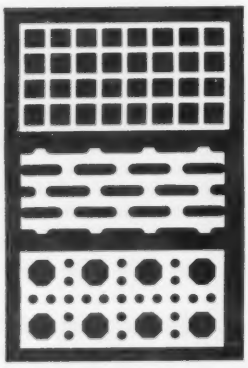
LET UNIVERSAL SUPPLY AND GRIND IT

Eliminate double purchasing and re-handling bar stock for precision finished straight shafting. Universal's quote on stock and finish will delight you . . . and there's no delay.

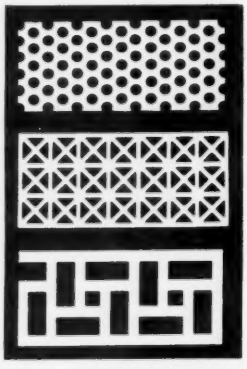
Materials — Mild Steel, Alloys, Non-Ferrous.
Finish — To 5-micron.

Ask for Universal's illustrated catalog file covering 14 grinding operations that can save you time and money.

UNIVERSAL GRINDING
CORPORATION
2200 Scranton Rd., Cleveland 13, Ohio



THE *MONEY-SAVING* **ANSWER** to **Many Production Problems**

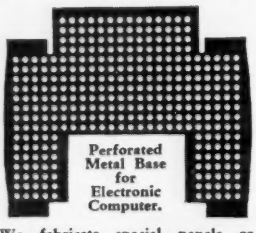


DIAMOND PERFORATED METAL

Sheets • Plates • Panels • Fabricated Parts

For nearly half a century we have supplied America's largest industrial organizations with perforated metal products of all kinds; in lots to meet their production schedules. This procedure not only reduces their inventory costs but, usually, also assures other substantial savings because of our special facilities for producing this type of work efficiently and economically.

Send us YOUR blue prints and specifications. Our experienced engineers are often able to make cost-cutting suggestions without charge or obligation.

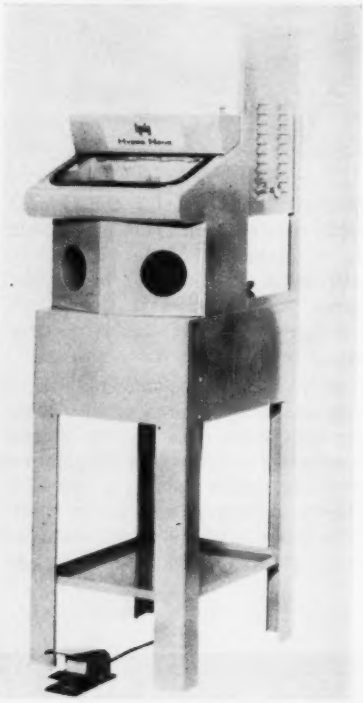


We fabricate special panels or parts to any desired extent. Illustrated Catalog on request.

DIAMOND MANUFACTURING CO., WYOMING (Wilkes-Barre Area) **PENNA.**

NEW PRODUCTS and equipment

rated at 40 gpm with a 1/3 hp. 110 volt, single phase motor. Legs are adjustable for convenience of the operator, or the machine can be bench mounted.



Electrically controlled solenoid valves regulate air supply and the window washing mechanism.

For further information, *write* Hydro-Hone Corp., 11055 S. Palmer Ave., South Gate, Calif.

17 in. Drill Press Line Has Internal Depth Stop

PRECISION and economy are featured in a line of 17 in. drill presses. You can get hand or power feed, bench or floor models, and single or multiple spindles (76 models). Any of the models can be ordered with a ½ in. key chuck or No. 2 Morse taper spindle. Nominal capacity is ⅝ in. diameter holes in steel, ¾ in. in cast iron.

The drill press has an internal depth stop with a 5 in. spindle travel. The company says the internal stop mechanism provides positive control of pinion shaft rotation and eliminates the need for an external stop rod. It also eliminates

Is punched tape really the best input medium for numerical control?

(3 out of 4 machine tool makers say yes!)

Although 8-channel punched paper tape is only one of several numerical control input media, it is fast becoming the standard. Better than three-quarters of all builders of numerically-controlled machine tools now offer punched paper tape control. Why the swing to punched paper tape? There are three fundamental reasons:

1) Paper tape coding is visible, tangible. You can see it, touch it, and with practice even read it.
2) Paper tape is continuous. Unlike cards, it can't get out of order.
3) Paper tape is easy to program—preparation, verification, and reproduction of tapes are all handled on one inexpensive machine, the Friden Flexowriter® (illustrated).

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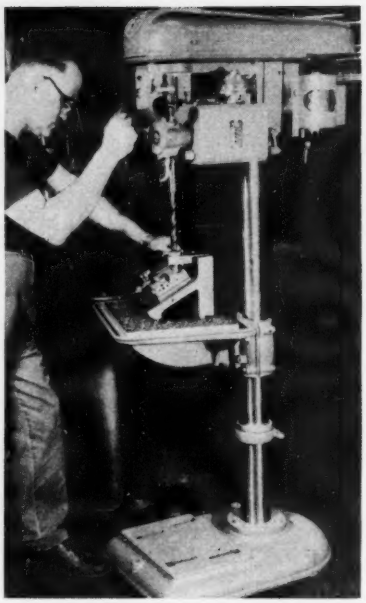

For further information, *write* Delta Power Tool Div., Rockwell Mfg. Co., 478 N. Lexington Ave., Pittsburgh 8, Pa.

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THE available sizes of "balanced design," parallel shaft, speed reducers have been boosted to 57 with the addition of 23 sizes. The company says drive selections can now be matched more closely to horsepower requirements with a saving in drive costs. Single, double, and triple reduction units are available in capacities up to 2800 hp at high or low output speeds and ratios up to 292:1.

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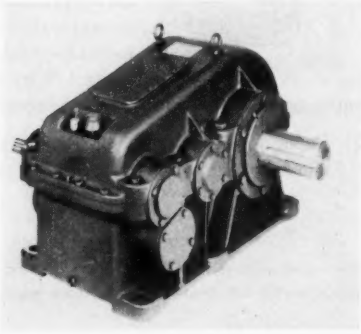

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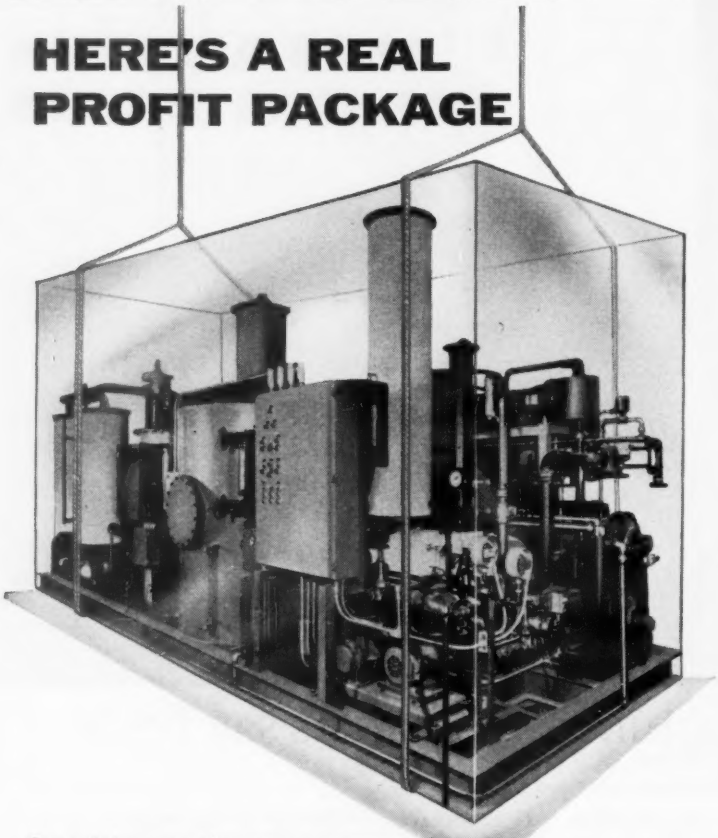

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For further information, *write* Dept. PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

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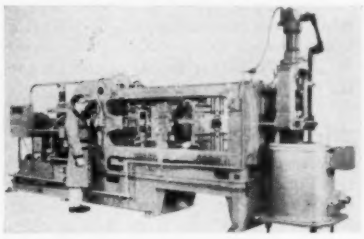
A ZINC diecasting machine (HP-45OZ-SF) delivers 450 tons of clamp (certified by strain gage tests) while providing a die opening stroke which is adjustable from 8 to 30 in.

The unit can produce deep draw, zinc parts (examples: washing machine agitators and automotive trim) weighing up to 15¼ lb. The machine has the Lester zinc end



which is self-aligning and requires only one adjustment for final setup.

The system has a nitogen accumulator with 5280 cu in. capacity. The injection plunger stroke measures 9 in. The injection shot end of the machine has positions at center and 6 in. below center.

Maximum die height is 30 in. and is adjustable to a minimum die height of 9 in. with 3, 6, and 9 in. spacer rings. Total daylight is 60 in. The cycle at the 8 in. die opening is 5.7 seconds; it's 7.5 seconds at 30 in.

For more information, *write* Dept. N-2, Lester - Phoenix Inc., 2711 Church Ave., Cleveland 13, Ohio.

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A CONVEYORIZED system for settling out large particles from mineral oil or water soluble coolants is available in tank sizes starting at 1000 gallons.

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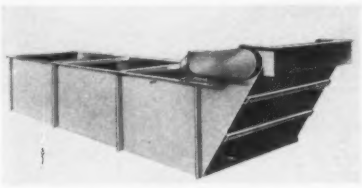

makes the settling operation 70 to 90 per cent efficient (depending on coolant viscosity and size, weight, and nature of the contaminating particles). Operation is automatic from the start to the point of dropping sludge into a disposal container. The system requires no servicing.

Only occasional emptying of the sludge pan is required.

The conveyor ramp can be built to extend upward to discharge at any height above floor level. Conveyor flights, chain, and sprockets are built to handle heavy sludge loads.

For further information, *write* Olson Filtration Engineers, 5024 Section Ave., Cincinnati 12, Ohio.

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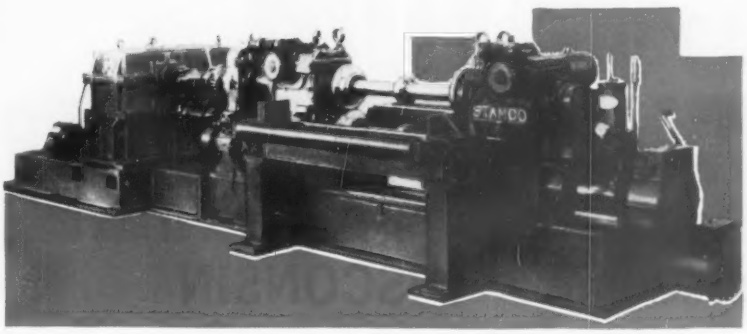

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NEW literature

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Diecasting in Georgia

A report defines the potential for a custom or job shop diecasting producer in Georgia and the surrounding five states. A custom diecasting market of at least $5 million has been determined in the area, states the report. Georgia Department of Commerce, 100 State Capitol, Atlanta, Ga.

Cleaning for Galvanizing

A revised bulletin discusses the preparation of steel prior to hot dip galvanizing. Specify Service Bulletin No. 80A. Oakite Products Inc., 134E Rector St., New York 6, N. Y.

Fluid Power Systems

"Fluid Power News 14" presents several case histories of fluid power equipment in the metal producing and fabricating industries. Oilgear Co., 1570 W. Pierce St., Milwaukee 4, Wis.

Relay Maintenance

"How to Adjust and Maintain Relays" contains eight pages of detailed instructions about correcting relay difficulties. Line drawings are included. P. K. Neuses Inc., 511 N. Dwyer St., Arlington Heights, Ill.

Wire Reinforcement

Welded wire fabric data and other design information for reinforced airport concrete pavement are given in a 96 page book. Dept. AP-11, Wire Reinforcement Institute, 1049 National Press Building, Washington 4, D. C.

NEW BOOKS

Standardization Activities in the United States, Sherman F. Booth, National Bureau of Standards, 210 pages, $1.75 (order from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

The directory is an inventory of work and objectives of public and private organizations involved in standardization. Each organization is listed alphabetically with a brief description of its area and accomplishments. The compendium includes materials, techniques, sizes, nomenclature, services, and other areas.

Metal Cutting Bibliography, American Society of Tool & Manufacturing Engineers, 10700 Puritan Ave., Detroit 38, Mich., 1000 pages, $20

After examining foreign and domestic books, papers, pamphlets, and articles, 5593 abstracts of original material were prepared and coded for the book. An author index (19 pages) and a subject index of 162 pages are included.

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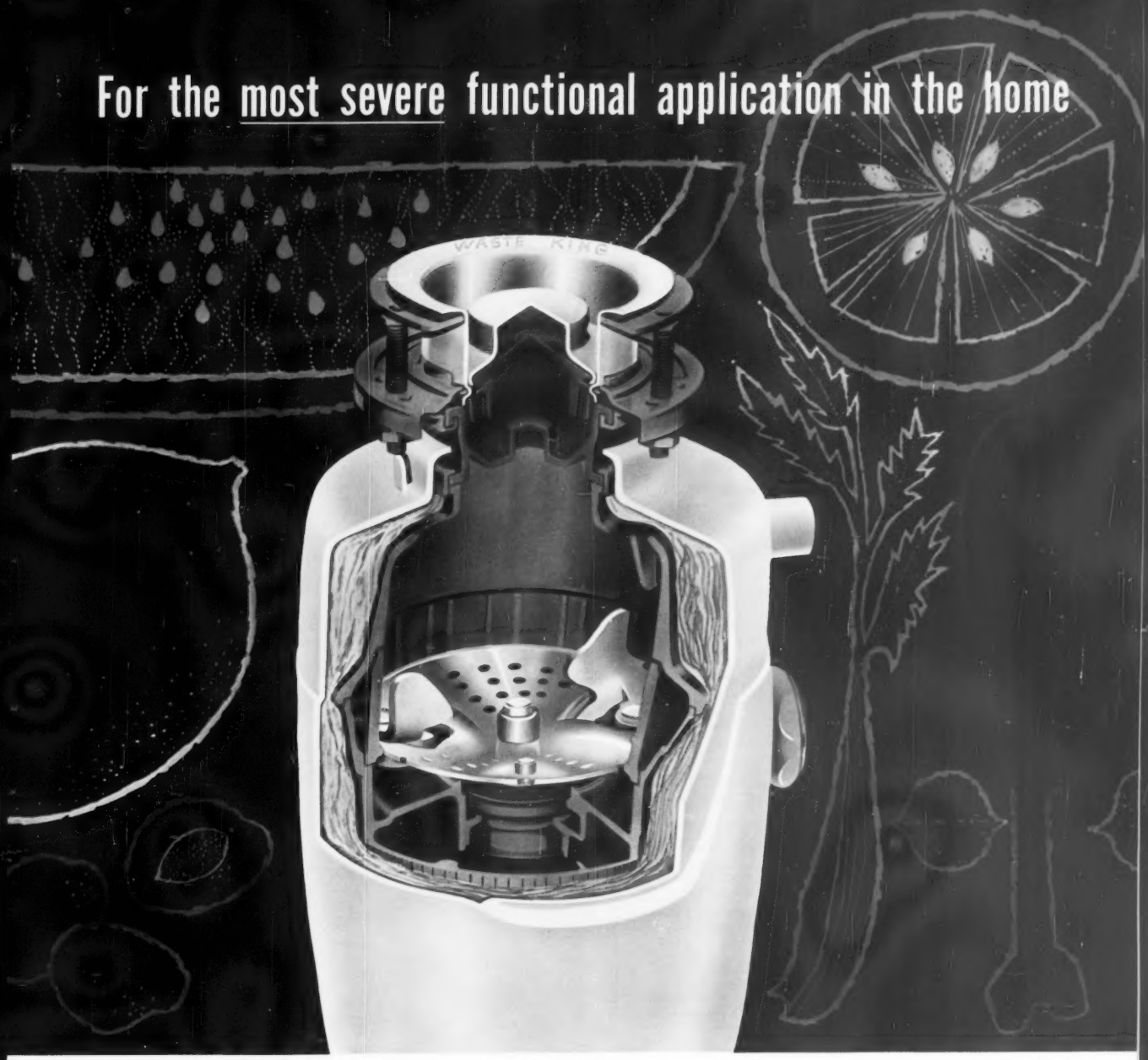

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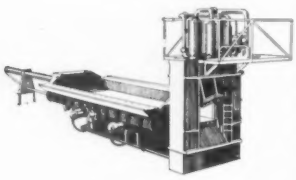

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Steel to Rise Despite Recession

LOOK FOR a 10 point jump in the steel industry's operating rate when buyers stop cutting their inventories.

It won't happen tomorrow or next week. It may not occur until the first quarter of next year. But when it does, demand will automatically increase by 1 million tons a month because that's the rate at which stockpiles have been shrinking. To produce the additional tonnage, steelmakers will have to operate their furnaces at 65 per cent of capacity. As they step up their output, they may have to extend leadtimes on some of their products. And if buyers react by raising their inventory objectives, the market will strengthen appreciably.

NO SIGNS OF HEDGING— Until liquidation ends, there's little hope for an upswing in demand. New orders and shipments have been at a standoff for several weeks, and there's no indication that buyers will step up their purchases next month in anticipation of higher prices. Market analysts predict that the industry's operating rate will average 54 per cent this month, 57 per cent in November, and 61 per cent in December. A fourth quarter rate of 57 per cent will make the year's output 102 million ingot tons.

NET REDUCTION OF STOCKS— It's believed that 1960 steel consumption will be about 105 million ingot tons (or 76 million finished product tons). Assuming that the industry ships 73 million tons of finished steel, consumer inventories at yearend will be 3 million tons smaller than they were on Dec. 31, 1959. For the year as a whole, users will chew steel up at a rate equivalent to 70 per cent of the industry's capacity. Fourth quarter consumption will probably be at a somewhat lower rate because of projected automotive cutbacks and seasonal declines in canning, construction, and railroad trackwork.

HIGH CONSUMPTION IN '61— Although economists predict a recession for next year, commercial research men in the steel industry don't expect much of a drop in basic metal requirements. They're pegging 1961 steel product consumption at 75 million tons and saying that 70 million is the lowest they can visualize. And mark this: Under the worst conditions imaginable, they would expect demand for steel to be stronger six months from now than it is today. If steel were consumed at an annual rate of only 65 million tons next year, monthly shipments would have to average 5.4 million tons. That's nearly half a million tons more than they've been averaging for the last three months.

OUTLOOK BY INDUSTRIES— Marketing men expect steel consumption next year to be moderately lower in the automotive, appliance, capital equipment, and construction industries. They look for slightly higher consumption by container manufacturers and the oil and gas industry. Canning suffered this year when cold weather damaged crops, reduced food packs, and kept beverage sales below normal. Tubular products suffered because of competition from imported steel and tight controls on oil production. Drilling activity probably won't increase next year, but inventory reduction will end, forcing buyers to order as much steel as they're using.

PRODUCTION RISES—Last week, steelmakers operated their furnaces at 54.6 per cent of capacity, up 1.2 percentage points from the previous week's revised rate. Output: About 1,556,000 ingot tons.

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*Current prices were published in the Oct. 10 issue and will appear in subsequent issues.

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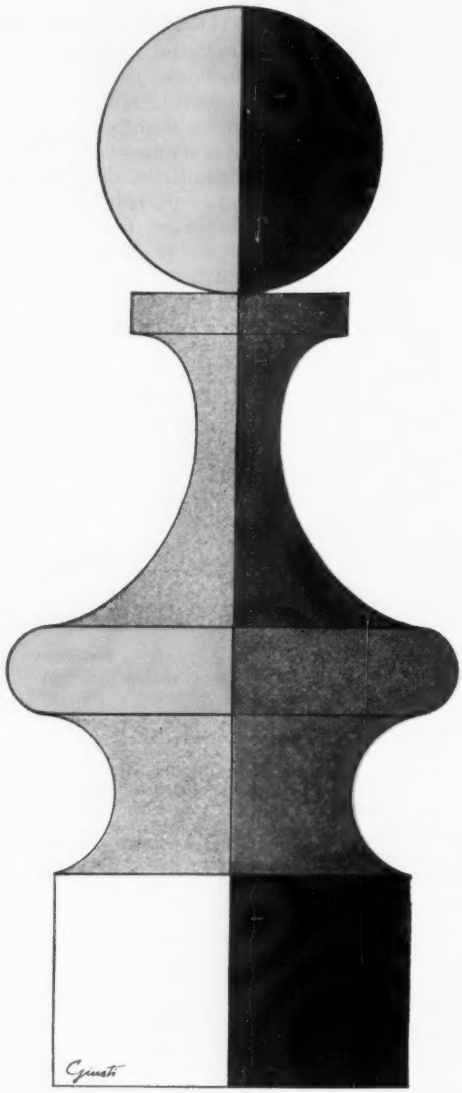

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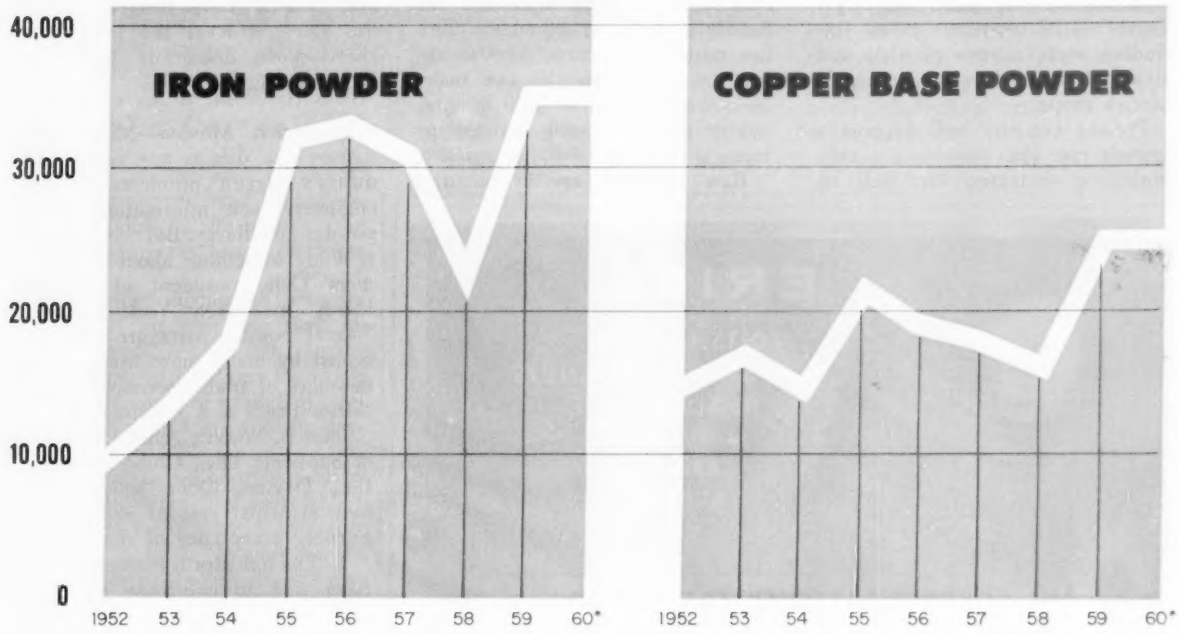
Metal Powders Hold at Record Levels

(Shipments in net tons)



*Estimated.
Source: Metal Powder Industries Federation.

*Estimated.
Sources: Business & Defense Services Administration; Bureau of the Census; Bureau of Mines; Metal Powder Industries Federation.

IN A YEAR when some of the biggest users of metal powder parts are having disappointing sales, producers of both powders and parts are expecting to equal last year's record shipments. Reason: They're capturing new markets and penetrating deeper into old ones.

As in many industries this year, there is no unanimity in the outlook. In a STEEL survey of partmakers, estimates of 1960 consumption of metal powders range all the way from 50 per cent above 1959's to 15 per cent below. But those who expect an upturn outnumber those who see a downturn 2 to 1.

• **Long Way to Go**—Powder metallurgy has come a long way, as the graphs above show, but most officials in the industry feel the greatest advances are still in the future.

You can get an idea of the progress being made in the increase in trade association activity. The Metal Powder Association was founded in 1943. Today, the industry is represented by the Metal Powder Industries Federation (MPIF), composed of six organizations dealing with specific phases of powder metallurgy.

Two metals dominate the industry—iron and copper base alloys. Iron powders are the most important tonnagewise today, and a large majority of partmakers tell STEEL they expect it to show the greatest growth in the foreseeable future. They point to its relatively lower cost (compared with other metals) and the belief that the greatest strides will be made in structural parts where iron and steel alloys are used most.

• **Markets Opening Up**—In its early days, the industry was known primarily for its small gears and bushings, and it has depended largely on the automotive and appliance industries for its growth. While those may continue to be the bread and butter uses for some time, many producers are trying to get away from dependence on them by developing new uses in such industries as electronics, office machinery, electrical machinery, and other places where structural parts are required. High temperature and high density, low porosity applications also hold promise.

Another spur to growth is the development of new metal powders or improvements in old ones. Uses for titanium, zirconium, and uranium powder metal parts are growing, says Kempton H. Roll, executive secretary of MPIF. And he claims that some of the early technical complications in working with stainless steel have been overcome. The acceptance of stainless powders is following the same trend as the overall acceptance of stainless and high alloy steels, he believes.

• **Market Oriented**—The industry is well situated (it's concentrated in the Midwest) to serve the bulk of the metalworking market. Mr. Roll states that 110 varieties of iron-

base powders are sold commercially by 11 companies; about 235 varieties of nonferrous powders are sold commercially by 14 companies. (However, many powders in the nonferrous group find their greatest use in nonmetalworking areas, such as pigments for the paint industry.) There are 27 producers in all (including some captive plants), and about 91 partmakers (including 21 captive shops).

Present capacity will support a growth rate that exceeds the most optimistic estimates. Mr. Roll reports: Last year, independent partmakers produced 875 million metal powder parts (about half the total) for sale. They can turn out more than 2 million parts on a three shift basis. Most of the parts are small, under 7 in. in diameter. But Mr. Roll says that some producers can handle 12 to 15 in. diameters. One has made 32 in. parts. Another reports to STEEL that he can make parts weighing up to 2500 lb. And nearly all are agreed that equipment is the only limitation on size.

Raw materials are in plentiful supply. Mr. Roll estimates that domestic capacity for iron powder is about 100,000 tons a year, or nearly three times 1960 shipments. Overcapacity is one big reason why foreign producers have not been too successful in the U. S. Imports of iron powder have held at about the 750 ton level the last three years—down drastically from the 13,000 ton figure in 1951.

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• **Promotion Minded**—Most partmakers cite this as one of the industry's biggest problems: Design engineers lack information about powder metallurgy. But the industry is doing something about it. Chalmers Dale, president of Charles Hardy Inc., New York, declares: "Metal powder parts are now accepted by many more users as the messages of trade sponsored design clinics reach and convince them."

John R. Powers, general manager of Supermet Div., Globe Industries Inc., Dayton, Ohio, believes that four principal reasons explain the growing acceptance of the process:

1. The industry is maturing. "We have had to overcome the back alley type of operation where sales, pricing, financing, and costs were pretty haphazardly handled. We have had a high rate of turnover in our industry. Fortunately, the situation is stabilizing."

2. "In the last year, our industry has sponsored three or four design clinics aimed at the potential customers for our products. This will be an ever expanding effort and should pay off (in the long run)."

3. Industrial magazines, such as STEEL, are doing a better job of presenting articles on the technical and market aspects of powder metallurgy.

4. Fabricators are active on standards committees of the federation and the American Society for Testing Materials, the Society of Automotive Engineers, and the Powder Metallurgy Section of the American Ordnance Association.

"When I came into this industry five years ago," relates Mr. Powers, "I . . . was often told by potential customers: 'We have tried powder metallurgy, and it didn't work at all.' With the advances of our industry in the last five years and a more mature attitude on the part of fabricators, we are overcoming this feeling rather rapidly."

Steel Employment Off in August But Payroll Rises

Employment (hourly and salaried) in the steel industry during August totaled 542,668, down slightly from the 554,069 reported for July. August's payroll, $300,259,708, was up noticeably from July's $286,967,361, the increase being explained by the longer hours worked, 34.2 in August vs. 30.6 in July.

Payroll costs per hour worked by hourly employees was $3.313 in August against $3.382 in July (not including 45 cents added employee benefits).

Employment during the first eight months of this year was 603,294; payroll was $2,782,663,704. In the like 1958 period (last year for which comparable data are available), employment was 515,381 and the payroll $2,120,865,674.

Payroll costs per hour worked by hourly employees averaged $3.361 in the first eight months this year vs. $3.127 in 1958. In addition, it's estimated employee benefits will cost 45 cents an hour on the average this year against 32.2 cents in 1958, making total estimated employment cost for the first eight months this year $3.811 an hour.

Wage earners worked an average of 36.5 hours per week this year against 34.2 in 1958.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 182 & 183

While sheet demand in general continues to move sidewise, consumers of hot and cold rolled are buying a shade more actively at some points.

Apart from filling spot gaps in supply lines (occasioning requests for rush shipments), consumers have not started to rebuild inventories. Most users, however, have worked their stocks down to a point where they no longer can depend upon them to support current manufacturing schedules.

September bookings by the mills bettered those in August by a slight margin, and it's expected October volume will about equal that in September. Even though there is the possibility that prices may go up Dec. 1, no buildup of inventories is anticipated. Mill shipments are readily available (two weeks on hot sheets, three to four weeks on cold rolled, two weeks on galvanized).

Youngstown Sheet & Tube Co. will get back into the galvanized sheet market in the first quarter of next year when it starts up its new galvanizing line at Indiana Harbor, Ind. (The company last made the product in 1941.)

The Sendzimir-type line will have annual capacity of 132,000 tons and will process sheets up to 62 in. wide. It will produce coils up to 72 in. in diameter, weighing 48,000 lb, or sheets up to 22 ft in length.

Steel Bars . . .

Bar Prices, Page 181

Bar producers report a quickening in rush delivery orders, indicating low consumer inventories. However, mill shipments are still too easy to encourage the beginning of a general buildup of inventories. Hot carbon bar deliveries range around three weeks, while alloy bar promises average three to eight weeks—depending upon the processing involved.

Most bar users are buying in

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"SUPER-STEEL" abrasives are strictly top quality and perform as top quality abrasives should — in cleaning action, in number of passes and effect on equipment. In fact, we'll give you a written, *money-back guarantee* that "SUPER-STEEL" will equal the performance of any steel abrasive now on the market.

Here's an opportunity to save many important dollars on steel abrasives. Why not at least investigate? Write, wire or phone (collect) for full information and sample.

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MANUFACTURERS, ALSO, OF TOP QUALITY "SEMI-STEEL" SHOT AND GRIT, MALLEABLE AND CHILLED SHOT AND GRIT — AT COMPARABLE SAVINGS!

BRAZE BETTER!

use

AIRCOSIL NO. 18 FLUX with New Formulation

Silver alloy brazing turns out better when you use new *Aircosil No. 18 Flux*. Won't break down under long heat cycle up to approximately 1450°F. Chemicals stay in suspension, thanks to a new and improved formulation.

Won't spatter. Residue washes off with hot water. Long shelf life, because jar has new cover with flowed-in rubber seal. Supplied in ½, 1, and 5 pound jars; 30 and 50 pound containers.

For highest quality brazed joints on a wide range of ferrous and nonferrous alloys – use new *Aircosil No. 18 Flux*. Immediate delivery and complete information from your nearest Airco office or local distributor.

AIRCO AIR REDUCTION SALES COMPANY

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Divisions of Air Reduction Company, Incorporated
Authorized Distributors in most principal cities

limited volume; in bars, as with most other steel products, industry has experienced more than an inventory correction. Consumption continues to lag, and orders placed this month can be shipped near Nov. 1, indicating that new buying is not heavy enough to extend shipments.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 182

With construction being pushed as much as possible before the cold weather sets in, demand for reinforcing bars is up seasonally. Some producing mills are reported operating close to capacity and expect to continue at a high rate through this month. Other forms of reinforcing steel, such as highway mesh, are also in strong demand though producing facilities are not fully engaged.

Tubular Goods . . .

Tubular Goods Prices, Page 185

Demand for tubular specialties is depressed and shows no sign of picking up soon. September bookings were comparable with those in July and August, but they were far below producers' expectations. It seems the tubemakers today are even denied the shortlived spurts that have usually characterized demand in the past.

Some distributors are moving merchant pipe at a more active pace. Most warehouses have been drawing on their inventories and some of them now are finding it necessary to begin balancing their stocks.

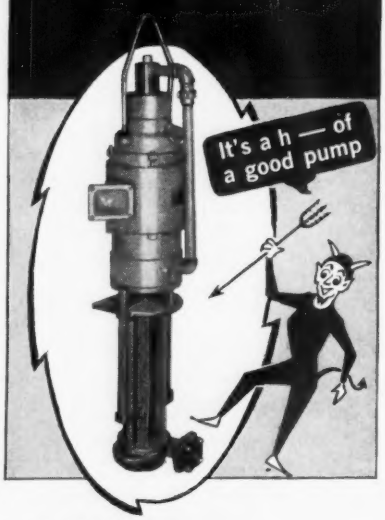
Structural Shapes . . .

Structural Shape Prices, Page 181

Considerable public work is before the structural market, including bridges and schools. Although substantial volume of private work is developing, fabricators still need work. Their backlogs are steadily shrinking. Of the 1,226,928 tons on fabricators' books for fabrication by Dec. 1, it's understood the larger capacity shops hold a heavier than normal share. Most new tonnage being booked is for 1961 shipment.

Most fabricators are buying structurals in line with their firm bookings. Structural rollings are a shade better, and fabricators report delivery promises are easier and more flexible. Generally, mill ship-

Pump MOLTEN METALS *Faster Better* WITH *Gusher* MOLTEN METAL PUMPS



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- DOES A BETTER JOB
- REDUCES HAZARDS TO EMPLOYEES
- SPEEDS UP HANDLING OF MOLTEN METALS

Gusher Molten Metal Pumps are vertical centrifugal type pumps specifically designed for handling molten salts, lead, babbitt, solders and other alloys at temperatures up to 1000 F.

THE Ruthman MACHINERY CO.

• COOLANT PUMPS
• CIRCULATORS • AGITATORS
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Cincinnati 2, Ohio

ments of shapes run two to four weeks.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2000 tons, high school, Hartford, Conn., to Belmont Iron Works, Eddystone, Pa.; Fusco-Amatruda Co., New Haven, Conn., general contractor.

970 tons, state highway bridge, Walpole, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; Bayer & Mingolla Construction Co., Worcester, Mass., general contractor.

910 tons, reconstruction of drydock No. 3, Naval shipyard, Portsmouth, N. H.; Seaboard Construction Co., Chelsea, Mass., is low on the general contract.

900 tons, junior high school, Massapequa, N. Y., through Joseph Biscegila, general contractor, to August Bellon, Rockaway, N. Y.

450 tons, high school, Philadelphia, through Frank H. Wilson, general contractor, to Samuel Grossi, Philadelphia.

370 tons, Yellowstone River bridge, Montana, to Pacific Coast Div., Bethlehem Steel Co., Seattle; general contract to W. R. Cahoon, Pocatello, Idaho, at $280,204.

350 tons, Clifton Simmons Junior High School, Aurora, Ill., to Vierling Steel Works, Chicago.

288 tons, state highway bridge, Portland, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Frank Rossi & Sons Inc., Gardiner, Maine, general contractor.

350 tons, addition, distribution house, Western Electric Co., Nashville, Tenn., to Allied Structural Steel Co., Akron, Ohio.

205 tons, state bridgework, Dauphin County, Pennsylvania, to High Welding Co., Lancaster, Pa.

200 tons, gaseous oxygen storage unit, Bethlehem Steel Co., Johnstown, Pa., to Bethlehem Steel Co.

197 tons, angles, Navy, General Stores Supply Office, Philadelphia, to Phoenix Steel Corp., Phoenixville, Pa.

170 tons, including 30 tons of concrete reinforcing bars, railroad bridge, Brunswick, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; H. E. Sarbent Inc., Stillwater, Maine, general contractor.

123 tons, bridge, Route 74, Tazewell County, Ill., for the state, to Vierling Steel Works, Chicago.

110 tons, Tollentine College chapel and dormitory, Olympia Fields, Ill., to Vierling Steel Works, Chicago.

STRUCTURAL STEEL PENDING

9418 tons, state bridgework, FIGE 60-3, Kings County, New York; bids Oct. 20.

8500 tons, Lewiston-Queenston arch span bridge over the Niagara River, for the Niagara Falls Bridge Commission, Niagara Falls, N. Y.; Bethlehem Steel Co., Bethlehem, Pa., is low bidder.

7500 tons, transmission towers, Consolidated Edison Co., Poughkeepsie, N. Y.; bids Oct. 28.

4000 tons, 18 story office building, Rochester, N. Y.; Diesel Construction Co., New York, general contractor.

2963 tons, state bridgework, FARC 60-177, Broome County, New York; bids Oct. 20.

2216 tons, state bridgework, PSC 6607, Niagara County, New York; bids Oct. 20.

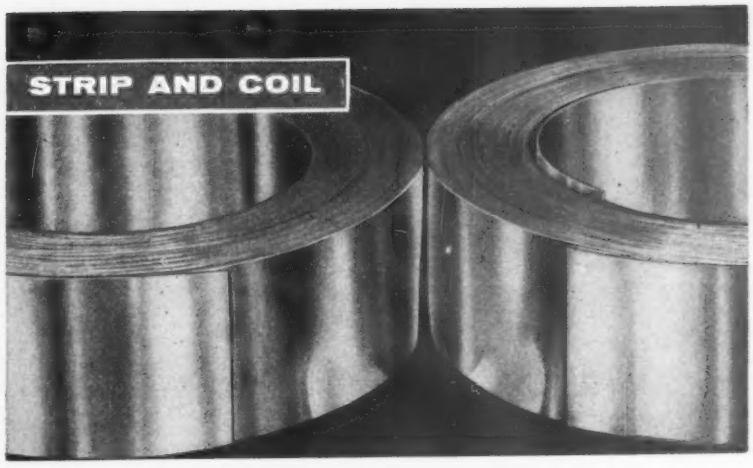
1038 tons, state bridgework, FINTC 60-2, Erie County, New York; bids Oct. 20.

1070 tons, state bridgework, FIASE 60-1, Bronx County, New York; bids Oct. 20.

1000 tons, fieldhouse, Syracuse University, Syracuse, N. Y.; R. C. Cullati is low on the general contract.

976 tons, state bridgework, FIASE 60-14, Bronx County, New York; bids Oct. 20.

380 tons, state bridgework, FALIE 60-3, Suffolk County, New York; bids Oct. 20.



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pure nickel for critical alloying

When the specifications call for *pure* nickel, you can count on Sherritt as a reliable source of supply. Sherritt's unique hydrometallurgical refining process yields nickel powders with a purity of 99.9%. This high-purity nickel comes to you in handy briquettes and in three grades of powder for faster, easier alloying. The low chilling property of Sherritt briquettes and powders makes them particularly desirable for alloying additions at the end of the heat. Special nickel grades and coated powders are also available. FOOTE MINERAL COMPANY *is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For complete illustrated brochure with prices and delivery information, contact the Foote Mineral Company, 4118 Eighteen West Chelten Building, Philadelphia 44, Pa.*

SHERRITT GORDON MINES LIMITED

600 tons, Public School 79, Manhattan, New York; bids Oct. 20.

600 tons, Public School 181, Manhattan, New York; bids Oct. 20.

600 tons, Public School 304, Brooklyn, N. Y.; bids Oct. 21.

600 tons, Public School 305, Brooklyn, N. Y.; bids Oct. 21.

503 tons, state bridge, Berks County, Pennsylvania; bids Oct. 28.

500 tons, Lehigh Valley Shopping Center, Bethlehem, Pa.; All-State Construction Co., Bethlehem, is low on the general contract.

400 tons, high school addition, New Dorp, Staten Island, N. Y.; bids Oct. 24.

394 tons, state bridgework, Clare and Isabell counties, Michigan; bids closed.

346 tons, state bridgework, Midland County, Michigan.

311 tons, Glidden Point Bridge, Newcastle-Damariscotta, Maine; bids Oct. 26 to Augusta, Maine.

263 tons, state highway bridge, Portland-South Portland, Maine; bids Nov. 2 to Augusta, Maine.

244 tons, state bridgework, RC 60-168, Westchester County, New York; bids Oct. 20.

200 tons, manufacturing building, Boonton, N. J.; bids closed Oct. 7.

150 tons, also 1000 ft of steel piling, railroad track relocation, Clark Canyon Dam, Beaverhead County, Montana; low bid to the Bureau of Reclamation is $1,395,336 by Cherf Bros. Inc. and Sandkay Contractors Inc., Ephrata, and A. R. Sims, Kennewick, Wash., jointly.

114 tons, state bridgework, RC 60-176, Sullivan County, New York; bids Oct. 20.

105 tons, single and three span beam bridges, Newcastle, Maine; bids Oct. 26 to Augusta, Maine.

100 tons, warehouse, Port of Everett, Wash.; Metro Construction Co., Everett, is low at $60,900.

REINFORCING BARS . . .

REINFORCING BARS PLACED

500 tons, state highway bridge, Walpole, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Bayer & Mingolla Construction Co., Worcester, Mass., general contractor.

203 tons, Washington State, King County bridge, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Welcome Construction Co., Seattle, general contractor.

110 tons, state highway bridge, Portland, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Frank Rossi Sons Inc., Gardiner, Maine, general contractor.

60 tons, Montana highway project, Helena, Mont., to Pacific Coast Div., Bethlehem Steel Co., Seattle; A. & B. Construction Co., Helena, is general contractor.

REINFORCING BARS PENDING

1000 tons or more, two Washington State girder spans, Spokane County; bids to Olympia, Wash., Oct. 25.

900 tons, Ideal Cement Co., Seattle plant, silos, etc.; L. H. Hoffman Co., Portland, Oreg., is low bidder.

100 tons plus, Washington State highway projects, Whatcom, Cowlitz, and King Counties; bids to Olympia, Wash., Sept. 25.

100 tons, Aurora overpass, Seattle; Mutual Construction Co., Seattle, low at $38,329 and alternatives.

75 tons, Washington State underpass, Whatcom County; Croy Construction Co., Bellingham, Wash., is low at $183,535.

Iron Ore Statistics—August, 1960

IRON ORE IN INVENTORY—AUGUST, 1960

(Gross tons)

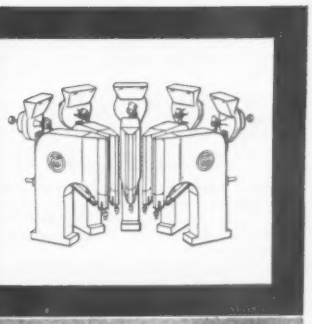
	U. S. Ores		Canadian Ores		Foreign	
At Furnace Yards:	L. Sup.	Other	L. Sup.	Other	Ores	Totals
Start of month	31,686,156	3,744,477	1,480,762	4,363,613	14,512,042	55,787,050
At Month's End:						
Mass., N. Y.	3,234,035	39,702	70,326	230,746	326,009	3,900,818
Pennsylvania	7,786,479	404,521	20,560	180,404	6,903,642	15,295,606
Md., Va., W. Va.	414,253	2,804	.....	2,095,764	2,664,700	5,177,521
Ky., Tenn., Tex.	383,204	234,286	.....	395,377	128,003	1,140,870
Alabama	871	1,830,138	.....	128,414	3,327,917	5,287,340
Ohio	9,841,635	50,392	688,371	2,014,989	1,115,100	13,710,487
Indiana	7,099,213	12,704	579,969	12,819	59,742	7,764,447
Illinois	4,892,568	42,356	57,180	.....	242,637	5,234,741
Mich., Minn.	3,493,892	.....	402,542	120,445	284,281	4,301,160
Colo., Utah, Calif.	.....	1,107,006	.....	.....	29,587	1,136,593
Undistributed	212	2,577	.....	.....	244	3,033
Total	37,146,362	3,726,486	1,818,948	5,178,958	15,081,862	62,952,616
At U. S. docks	2,921,961	.....	170,759	884,449	1,971,665	5,948,834
Total U. S. stocks	40,068,323	3,726,486	1,989,707	6,063,407	17,053,527	68,901,450
At Canadian Yards:						
Month's start	2,004,227	.....	130,383	258,720	32,942	2,426,272
Month's end	2,466,692	.....	163,351	394,866	51,095	3,076,004
Total U. S.-Canada	42,535,015	3,726,486	2,153,058	6,458,273	17,104,622	71,977,454

IRON ORE CONSUMPTION—AUGUST, 1960

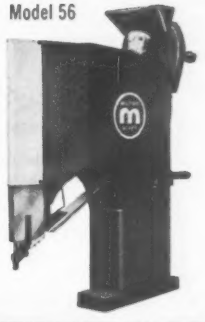
(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
In U. S.	L. Sup.	Other	L. Sup.	Other	Ores	Totals
Mass., N. Y.	328,526	4,914	6,334	35,641	12,516	387,931
Pennsylvania	597,917	152,827	7,135	29,763	606,262	1,393,904
Md., Va., W. Va.	109,565	22,474	.....	273,885	318,562	724,486
Ky., Tenn., Texas	31,335	61,596	.....	40,887	39,987	173,805
Alabama	.....	287,146	.....	794	121,206	409,146
Ohio	852,347	25,995	46,071	89,055	98,291	1,111,759
Indiana	915,937	2,167	71,514	.....	27,048	1,016,666
Illinois	418,476	23,616	9,629	.....	34,292	486,013
Mich., Minn.	444,032	.....	50,078	38,720	27,787	560,617
Colo., Utah, Calif.	.....	460,253	.....	.....	3,471	463,724
Undistributed	88	140	.....	.....	256	484
In U. S.						
Blast furnaces	2,257,578	598,397	100,034	213,661	484,186	3,653,856
Steel furnaces	125,098	45,156	12,031	14,647	340,181	537,113
Sintering	1,315,287	394,805	78,696	280,304	465,063	2,534,155
Miscellaneous	260	2,770	.....	133	248	3,411
Total U. S.	3,698,223	1,041,128	190,761	508,745	1,289,678	6,728,535
In Canada:						
Blast furnaces	209,145	.....	80,902	63,620	.....	353,667
Steel furnaces	1,213	.....	.....	12,322	7,154	20,689
Sintering	71,172	.....	15,609	31,923	.....	118,704
Miscellaneous	.....	.....	.....	.....	.....	.....
Total Canada	281,530	.....	96,511	107,865	7,154	493,060
Total U. S.-Canada	3,979,753	1,041,128	287,272	616,610	1,296,832	7,221,595

Data from American Iron Ore Association.



NEW "BUILDING BLOCKS" for automatic riveting



Milford's Models 56 and 57 offer unlimited flexibility in automatic assembly!

Group these new "Building Blocks" to suit your production needs. Use them singly, in pairs, in threes, fours or even fives. Write for more information on multiple riveting, the newest answer to reducing assembly costs.

For more new ideas, tips and technical data on tubular rivets and rivet-setting machines, ask your Milford Representative for a look at Milford's new MANUAL OF MODERN RIVETING PRACTICE.

THE MILFORD RIVET MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNA.
ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

50 tons, also 2700 ft of steel piling, government furnished; two spans Mt. Baker National Park, Washington State; bids to Bureau of Public Roads, Portland, Oreg., Oct. 28.

PLATES . . .

PLATES PLACED

400 tons, fabricated pipe, Riverdale-Marble Hill intercepting sewer and pumping station, New York, through Zephyr Construction Co., Brooklyn, N. Y., to Alco Products Inc., Schenectady, N. Y.

239 tons, high tensile, grade HY-80, Portsmouth, N. H., Naval shipyard, to U. S. Steel Corp., Pittsburgh.

225 tons, hull, Navy, General Stores Supply Office, Philadelphia, to Phoenix Steel Corp., Harrisburg, Pa.

208 tons, stainless, Navy, General Stores Supply Office, Philadelphia, to Eastern Stainless Steel Co., Baltimore; 35 tons, to Ingersoll Steel Div., Borg-Warner Corp., Chicago.

124 tons, hull, Navy, General Stores Supply Office, Philadelphia, to Penn Galvanizing Co., Philadelphia.

100 tons or more, high tensile, black, Naval shipyard, Philadelphia, to the Colorado Fuel & Iron Corp. at $162,257.

PLATES PENDING

1508 tons, high tensile, grade HY-80, Navy Purchasing Office, Washington, for delivery to Mare Island naval shipyard, Vallejo, Calif., bids Oct. 19.

913 tons, plates and sheets, Raritan Arsenal, Metuchen, N. J.; bids Oct. 25; also, 267 tons of steel strip, Oct. 21.

850 tons or more, extension Beacon Hill supply line; bids to Seattle, probably within 30 days.

300 tons, jet fuel storage facilities, Seymour Johnson AFB, Goldsboro, N. C.; bids Nov. 10 to the U. S. Engineer, Wilmington, N. C.

245 tons, 500,000 gallon elevated water tank, Minot AFB, Minot, N. Dak.; bids Nov. 3 to the U. S. Engineer, Omaha, Nebr.

PIPE . . .

CAST IRON PIPE PLACED

154 tons, 24 in. for system expansion, Wenatchee, Wash., to U. S. Pipe & Foundry Co., Seattle.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Chicago, Burlington & Quincy, thirty-six 2000-hp road switchers, to Electro-Motive Div., General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Pittsburgh & Lake Erie, 550 seventy-ton hoppers, to Despatch Shops, East Rochester, N. Y.

Canadian National, 50 forty-ton flatcars, to Dominion Steel & Coal Corp. Ltd., Sydney, N. S.

Trailer Train, recently noted as having awarded 1000 piggyback flatcars, has placed 800, with 200 yet to be definitely decided upon. The 800 will be built by American Car & Foundry Div., ACF Industries, New York, Pullman-Standard Div., Pullman Inc., Chicago, and Bethlehem Steel Co., Bethlehem, Pa. The awards include 500 recently noted as going to the named builders. As to the remaining 200 of the 1000 authorized, consideration is said to be given to a newly designed type developed by Pullman-Standard.

Chicago, Burlington & Quincy, 1385 freight cars, 600 boxcars, 350 covered hoppers, 50 bulkhead flatcars going to the road's own shops at Havelock, Nebr.; also 50 covered hoppers to General American Transportation Corp., Chicago. In addition, 285 cars will be purchased for Burlington's affiliates, Colorado & Southern and Ft. Worth & Denver, with 275 going to the Havelock, Nebr., shops and 10 to General American Transportation Corp.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 188

Production of coke in August totaled 3,996,650 net tons (3,923,136 oven, 73,514 beehive), reports the U. S. Bureau of Mines. In the preceding month, 4,025,472 tons were produced (3,975,089 oven, 50,383 beehive). Output in August, 1959, was only 1,838,700 tons (1,788,800 oven, 49,900 beehive) because of the steel strike.

The coke ovens produced 42,447,393 net tons in the first eight months of this year (41,708,092 oven, 739,301 beehive). Output in the same period last year was 41,736,400 tons (40,894,800 oven, 841,600 beehive).

Coke breeze production in August was: From slot-type ovens, 246,104 tons; beehive ovens, 3231 tons. In July, slot-type ovens produced 251,358 tons, beehive ovens 1168 tons. Production in August, 1959, was: From slot-type ovens 128,600; from beehive ovens, 2400. Output in the first eight months: From slot-type ovens, 2,648,103 tons; beehive ovens, 29,287 tons. In the same period of 1959, slot-type ovens produced 2,765,800 tons, beehive ovens, 60,900 tons.

Producers' stocks of oven coke at the end of August totaled 4,275,257 net tons, equal to 33.8 days' production. That compares with 3,943,857 tons, or 23.4 days, at the end of the same month a year ago.

Beryllium Prices Change

Price adjustments on several beryllium products have been announced by Beryllium Corp., effective Oct. 6. Ingot and billet prices are up 3 cents a pound and rod and bar prices up 4 cents a pound. Strip size extras were adjusted up or down, depending on the size and type of alloy.

At the same time, Berylco beryllium copper strip size extras were expanded to four additional widths and three thickness sizes. Minimum thickness was 0.002 in. Now it is 0.001 in. Five new width dimensions are included in the new schedule.

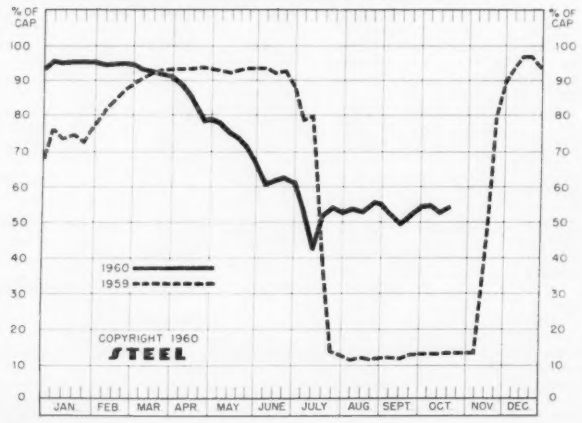
DISTRICT INGOT RATES

(Percentage of capacity utilized)

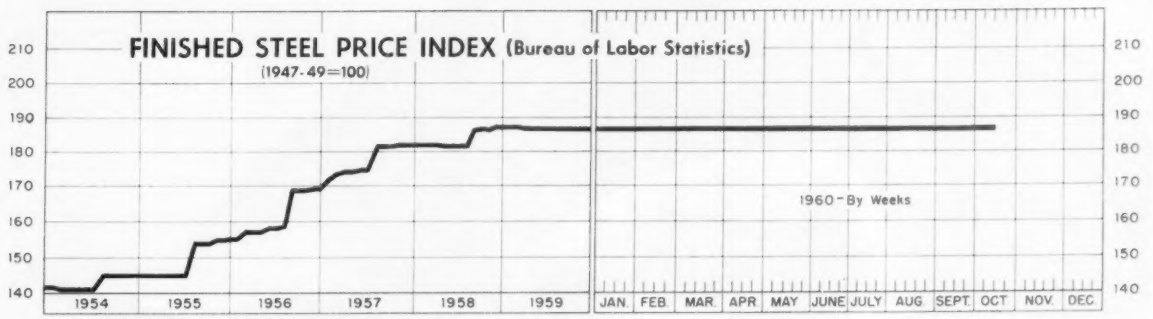
	Week Ended Oct. 16	Week Ago	Month Ago	Year Ago
Northeastern	63	66	58	*
Buffalo	49	18	59	*
Pittsburgh	45	46	42	*
Youngstown	46	46	43	*
Cleveland	53	59	48	*
Detroit	71	71	71	*
Chicago	59	58	62	*
Cincinnati	62	62	57	*
St. Louis	80	82	75	*
Southern	53	45	45	*
Western	53	54	53	*
Total Industry	54.6	53.4	53.0	13.0
Index (1947-49=100)	96.9	94.7	94.0	22.9
Net Tons (In thousands)	1,556	1,522	1,510	368

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute. *Not available due to general strike.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Oct. 11, 1960	Week Ago	Month Ago	Sept. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Oct. 11

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430	Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Casing, Oil Well, Carbon (100 ft)	201.080	Black Plate, Canmaking Quality (95 lb base box)	7.900
Casing, Oil Well, Alloy (100 ft)	315.213	Wire, Drawn, Carbon	10.575
Tubes, Boiler (100 ft)	51.200	Wire, Drawn, Stainless, 430 (lb)	0.665
Tubing, Mechanical, Carbon (100 ft)	27.005	Bale Ties (bundles)	7.647
Tubing, Mechanical, Stainless, 304 (100 ft)	195.395	Nails, Wire, 8d Common	9.433
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100	Wire, Barbed (80-rod spool)	8.414
		Woven Wire Fence (20-rod roll)	21.008

STEEL's FINISHED STEEL PRICE INDEX

	Oct. 12 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.661

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.14
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	30.17	30.67	32.33	44.33	45.33

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Oct. 12 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.50
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.50
Sheets, H.R. Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 1/2-5/8" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton

	Oct. 12 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.16
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	59.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$28.50	$28.50	$30.50	$44.50	$44.50
No. 1 Heavy Melt, E. Pa.	34.00	35.00	35.00	45.00	46.50
No. 1 Heavy Melt, Chicago	28.00	28.50	31.50	43.50	45.00
No. 1 Heavy Melt, Valley	28.50	30.50	33.50	44.50	48.00
No. 1 Heavy Melt, Cleve.	26.50	28.50	31.50	41.50	44.50
No. 1 Heavy Melt, Buffalo	27.50	27.50	29.50	33.50	38.50
Rails, Rerolling, Chicago	49.50	52.50	53.50	64.50	65.50
No. 1 Cast, Chicago	36.50	38.50	40.50	57.50	48.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

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Steel Prices

Mill prices as reported to STEEL, Oct. 12, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 182; footnotes, page 184.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 .....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ..109.00
Warren,O C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ...7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1 .5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. .I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 .....7.95
Cleveland J5 , R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Pa. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5 ..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ...6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.06
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra)
Carbon
LosAngeles P2 S30 ..11.75*
Alloy
Ambridge, Pa. W18 ..10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2. .7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 .....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025

Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J6 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft. Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ...5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14...6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ....6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 ....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ...5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.26
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975•
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875•
Middletown,O. A10 ...6.875†
Pittsburg,Calif. C11 ...7.625•
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 ....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 .....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1. .5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6 7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J. R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 .....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ...7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (FERROLITE) (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin Pa. U5	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.30
Fairless,Pa. U5 .....8.30
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 .....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 .....8.20
Yorkville,O. W10 .....8.20

HOLLOWARE ENAMELING (Black Plate (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 .....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	....	9.975*11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	....	9.875*11.20*	11.90*	13.05*	....
Mansfield,O. E6	....	9.875*11.70	12.40	13.55	14.65
Newport,Ky. A2	....	9.875 11.70*	12.40*	13.55*	14.65*
Niles,O. M21	....	9.875*11.70	12.40	13.55	....
Vandergrift,Pa. U5	....	9.875*11.70	12.40	13.55	14.65
Warren,O. R2	....	9.875*11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	..	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16...8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 ...12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192*
Jacksonville Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	9.00 9.75*
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Chicago W13	9.00 9.55**
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

$\frac{7}{16}$ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: 5% Carbon Base	10% Carbon Base	15% Carbon Base	20% Carbon Base	Sheets: 20% Carbon Base
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.80	44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0 505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.845
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward,Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago R2	66.00	66.50	66.50	67.00
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon,Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	Nom.	Nom.	Nom.	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark,N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding,Monaca,Pa., deld.	....	68.26	68.26	69.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield,Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry. K2	89.00
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro,Pa. B10 (Phos. 0.075% max)	$73.00
Lyles,Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood,Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland,Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy,N.Y. R2 (Phos. 0.075% max)	73.00

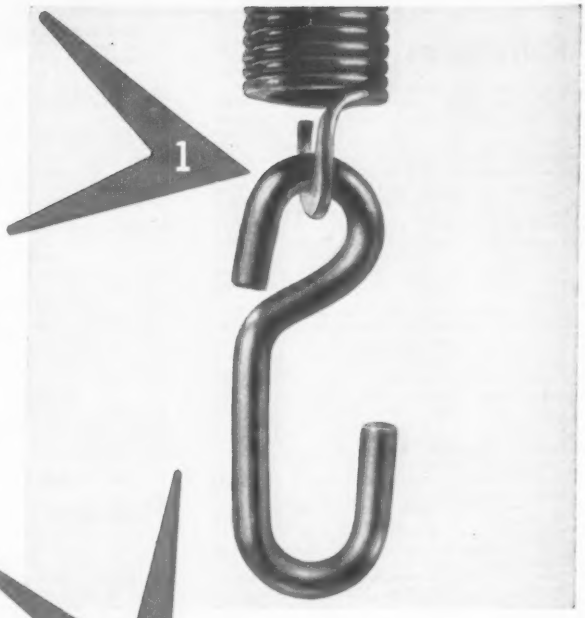
Steel Service Center Products

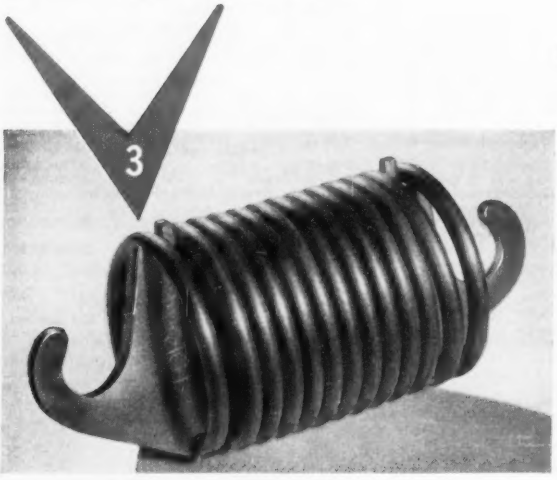
Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

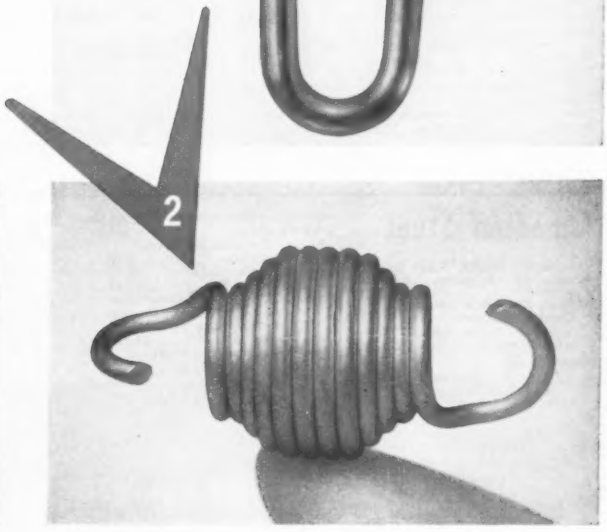
	SHEETS				STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.80	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.35	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	9.84	10.05	....	....	10.64	9.82	12.74	....	9.16	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.15	16.45	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. x 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅜ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Why it pays to look at the end in the beginning







1. In this pick-arm spring for a textile machine, natural frequency vibration plus rigid end restraint caused early failure. By redesigning spring and adding swivel hook to end assembly, failure was avoided and cost reduced as well.

2. Fatigue failure caused by bending stresses occurs where end hooks join working coils. In this method of reducing the combined stress, two coils at each end are wound with a reduced diameter.

3. Another method for reducing stress concentration where end hooks join coils is to thread a flat stamping into end coils.

Here are a few examples of why it pays to call on the springmaker early in your design problems. End-hook failure of extension springs is a common occurrence that experience can help avoid. Check your specifications for performance and production economy by consulting an A.S.C. spring engineer. Write for bulletin "How to Solve Your Spring Design Problems."

9903

Associated Spring Corporation

General Offices: Bristol, Connecticut

Wallace Barnes Division, Bristol, Conn. and Syracuse, N. Y.
B-G-R Division, Plymouth and Ann Arbor, Mich.
Gibson Division, Chicago 14, Ill.
Milwaukee Division, Milwaukee, Wis.
Raymond Manufacturing Division, Corry, Penna.
Ohio Division, Dayton, Ohio
F. N. Manross and Sons Division, Bristol, Conn.
San Francisco Sales Office, Saratoga, Calif.
Seaboard Pacific Division, Gardena, Calif.
Cleveland Sales Office, Cleveland, Ohio
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.

Canadian Subsidiary: Wallace Barnes Co., Ltd., Hamilton, Ont. and Montreal, Que. Puerto Rican Subsidiary: Associated Spring of Puerto Rico, Inc., Carolina, P.R.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex , Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa.; Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines; Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:
Carbon, Forging Quality (net ton) $97.00
Alloy (net ton) ... 115.00

Wire Rods:
Carbon ⅜" to under ¼ in. 5.30
Carbon, ¼ in. to 47/64 in. 5.70
Alloy 6.40
Wire (Carload lots) .. 8.40

Bars & Small Shapes:
Carbon, merchant quality 5.40
Carbon, special quality 5.85
Alloy 6.40

Bar Mill Bands:
Carbon 5.40
Alloy 8.05

Structural Size Angles & Zees 5.40

Plates:
Carbon 5.45

Sheets & Coils, Hot Rolled:
Carbon Sheets 5.00
Carbon Strip 5.00

Sheets & Coils, Cold Rolled:
Carbon Sheets 6.35
Carbon Strip (0.080 and lighter) 6.35
Carbon Strip (0.081 and heavier) 6.65

Sheets & Coils, Galvanized:
Standard Quality .. 6.70
Culvert Quality ... 7.00

Sheets, Porcelain Enameling 7.45

Sheets & Coils, Electrical:
Field Grade 9.00
Armature Grade .. 9.50
Electrical Grade .. 10.15

Tin Mill ....(Per Base Box; Products 100 lb basis wt)
Coke Tin Plate (1.25 lb pot yield) $10.60
Electrolytic Tin Plate (0.25 lb coating) . 9.10
Black Plate 8.30

Nails, c.l. lots ....(per keg) 400 keg min. $8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags ....8.10††	
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe..36.75, ton, del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ..	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots 41.80	
Brass, 80/20, leaded (60 mesh)	39.90
Bronze filter powder, 90/10	47.00*
Copper, all types 15.25*	
Lead	7.50*
Manganese, minus 35 mesh 1.00	
Nickel, all types ..0.78-1.06	
Nickel-Silver	60.70
Solder	15.00*
Stainless Steel, 304 ..	89.00
Stainless Steel, 316 ..	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	25.90
Cobalt: 98.5%, minus 100-300 mesh...1.57-1.58	Dollars
99.5%, below 5 microns	2.32
Tungsten: Carbon and hydrogen reduced, 98.8% min., minus 65 mesh .....nom.**	Dollars
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ...	$5.75	....	$5.65	$5.50	$5.85
Bar Size Angles	5.95	....	5.85	5.70	6.05
Structural Angles	5.95	....	5.65	5.50	5.85
I-Beams	5.70	....	5.60	5.45	5.80
Channels	5.70	....	5.60	5.45	5.80
Plates (basic bessemer)	5.85	....	5.75	5.60	5.95
Sheets, H.R.	Nom.	....	Nom.	Nom.	Nom.
Sheets, Galvanized, 20 Ga., 36 in. x 96 in. ...	Nom.	....	Nom.	Nom.	Nom.
Sheets, Galv. (in coils) 20 Ga., 48 in. wide ..	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.95	....	5.85	5.70	6.05
Hot-Rolled Bands	6.20	....	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	6.40	....	6.20	6.20	6.60
Wire Rods, O. H., No. 5	6.55	....	6.35	6.35	6.70
Bright Common Wire Nails (§)	7.25	....	7.15	7.00	7.35

*Books closed for 1960-61 shipping season. †Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer $11.60
Lump ½ in. and up 12.85
Fines, under ½ in. 10.72
Mesabi nonbessemer 11.45
Old Range bessemer 11.85
Old Range nonbessemer 11.70
Open-hearth lump 12.70
High phos. 11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates .....nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 23.00†
Chilean, 62-65%, c.i.f. Atlantic ports .. 22.00
Brazilian, 68.5%, f.o.b. vessel, Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $19.75-20.00
Domestic, concentrates, f.o.b. milling points 22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 .....$34.00-35.00†
48% no ratio .....25.00-26.00†

South Afican Transvaal

44% no ratio .....18.75†
48% no ratio .....24.00-26.00†

Turkish

48% 3:1 .....36.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60% $2.50-2.80
60-65% 2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace $14.75-15.25
Connellsville, Pa., foundry 18.00-18.50

Oven Foundry

Birmingham, ovens $30.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Chattanooga, Tenn., ovens 30.80
Detroit, ovens 32.00
Pontiac, Mich., deld. 33.95
Saginaw, Mich., deld. 35.53
Erie, Pa., ovens 32.00
Everett, Mass., ovens: New England, deld. 33.55*
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.54
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens 30.75
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.35
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.68
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

*Within $5.15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene 31.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 6.00
Toluene, one deg. (deld. east of Rockies) 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75

Per net ton bulk, f.o.b. cars or truck, plant.

Ammonium sulfate, regular grade $32.00

Downtrend in Scrap Extended

STEEL's composite on No. 1 heavy melting steel declines another 50 cents a ton to $30.17. Prospects for an early upturn dim with steelmaking operations showing little change

Scrap Prices, Page 192

• **Chicago**—The market is listless, and open hearth and blast furnace grades of scrap are off $1 a ton; electric furnace and foundry grades are down $2. A mill paid $29 for No. 1 industrial heavy melting. For customer returned industrial No. 1 material, another mill continues to pay $30.

No. 1 dealer heavy melting has fallen $18 a ton since the end of the steel strike. It was selling at an all-time high of $68 in December, 1956.

The $2 drop in the price of foundry grades reflects the reduced demand for castings, which is limiting operations at gray iron jobbing shops to three or four days a week.

• **Philadelphia**—Domestic prices on No. 1 heavy melting and No. 2 heavy melting are off $1 a ton on light buying, now holding at $34 for No. 1 and $30 for No. 2, delivered. All other grades are unchanged but easy.

• **New York**—Trading in the domestic market is apathetic. However, moderately good demand on export account is sustaining the market on the major steel grades. Prices on stainless scrap have dipped, brokers now offering to buy 18-8 sheets, clips, and solids at $155-$160, and 430 material at $65-$70.

• **Boston**—Prices on the steelmaking grades are lower, partly reflecting slower export demand. Domestic buying is also slow, and prices are largely dependent on activity in the eastern Pennsylvania market.

• **Pittsburgh**—The market has hit bottom, in the opinion of some observers, but few predict an early rally. An upturn depends on the steelmaking rate, and no signifiant change is in prospect. Some local steel mills are releasing a carload at a time against old scrap orders. Others have withdrawn entirely from the market. P&LE Railroad was offered $30 for No. 1 heavy melting steel.

• **Cleveland** — Mills are showing little interest in dealer offerings despite the attractiveness of prices—now the lowest in about six years. Published quotations are largely nominal, but brokers think No. 1 dealer scrap ($26-$27) is close to if not already on bottom.

• **Buffalo**—Bethlehem lifted its embargo on scrap shipments when the strike on the South Buffalo Railway was settled.

• **Detroit** — The market is quiet here. There has been a little activity in mixed cast grades, though not enough to effect any change in prices. Exports to Canada are down,

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Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods.

Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month.

To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

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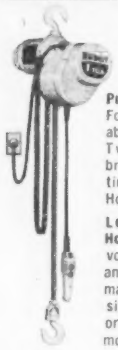
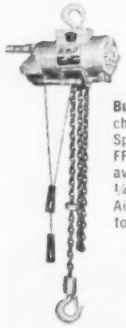


ELECTRIC HOISTS

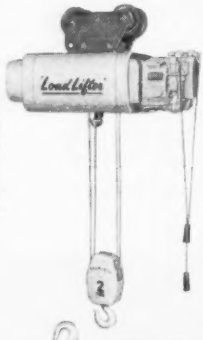
Push Button Budgit Electric Hoist. For regular hoisting service. Portable. Hang up, plug in, and use. Two fully enclosed automatic brakes give fast, accurate spotting. ½-ton model lifts at 34 FPM. Hook suspension. ⅛ to 2 tons.

Load Lifter Wire Rope Electric Hoists. ½ to 15 tons. Safe 24-volts at the push-button. Single and 2-speed control. Two automatic brakes. Lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model, too.



AIR HOISTS

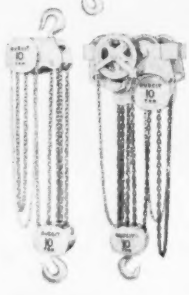
Budgit Air Hoist. Link and roller chain types. Pendant cord control. Speeds infinitely variable to 75 FPM. Rigid mount push trolley available. Safety hooks standard. ¼, ½ and 1 ton. Also Load Lifter Air Hoists with wire rope load line to 15 tons.

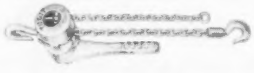


CHAIN BLOCKS

Budgit Chain Blocks. ¼ to 10 tons. Light, tough aluminum frame. 25 lb. pull on hand chain lifts 500 lbs. Fast action load brake makes lowering easy. Hook suspension or Army type trolley.

Tugit Lever-Operated Hoist. Light, compact, portable. Easy to operate even in close quarters — lifts or pulls at any angle. A fine maintenance tool. ¾ to 3 tons.





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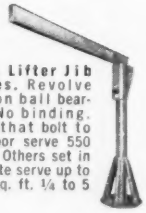
Budgit Crane Assemblies. Low-cost "build it yourself" kits to construct single girder cranes up to 6 tons and 30 ft. span without special tools. You buy I-beam locally to save more. Packaged electric bridge drive adds efficiency. Kits also for 180° swinging bracket jib cranes up to 4½ tons, 10 ft. reach.

Load Lifter Jib Cranes. Revolve 360° on ball bearings. No binding. Types that bolt to the floor serve 550 sq. ft. Others set in concrete serve up to 1500 sq. ft. ¼ to 5 tons.



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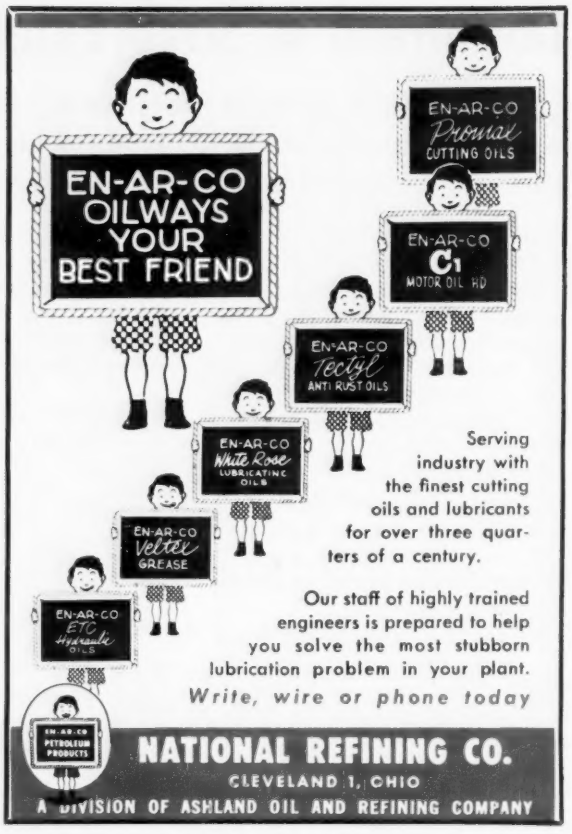
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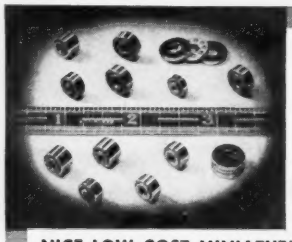

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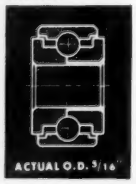

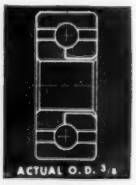

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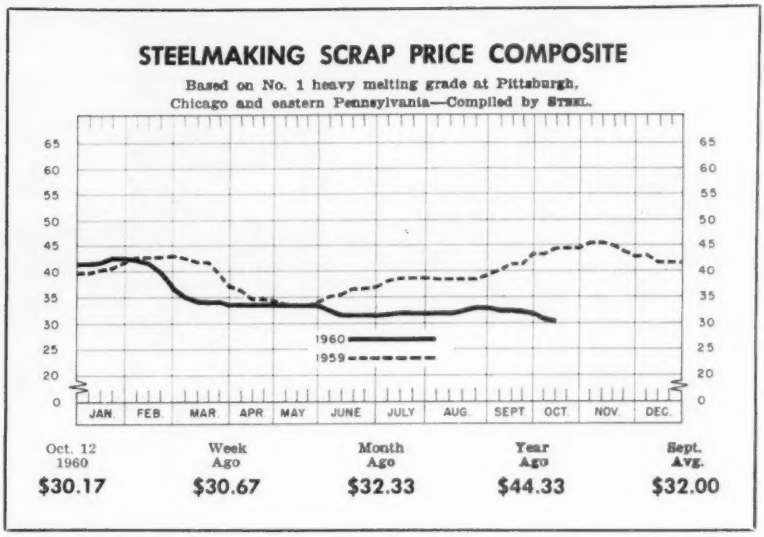

and dealers and brokers do not anticipate much activity the rest of the year. They expect prices to drop on the next auto lists. The buildup of inventories, both at yards and mills, is being avoided because of yearend personal property taxes.

• **Cincinnati**—The market here is slow. One local mill is placing only small orders, while another indicates it won't take in any tonnage this month.

• **St. Louis**—There is virtually no demand for scrap here. Prices are lower on several grades, mainly railroad material. Reductions range from 50 cents to $2 a ton. Buyers are discouraging the flow of scrap.

• **Birmingham**—Prices are off on some grades of scrap. No. 2 heavy melting is quoted $2 down from the recent market level, as are bar crops, structurals, and plates. Electric furnace bundles are off $1 a ton. No. 1 cupola cast is quoted $2 a ton lower. So are angles and splice bars.

• **Houston**—Moderate export demand is noted in the Gulf Coast area, but generally the market continues slow.

• **San Francisco** — Price schedules have been revised downward, but they are nominal in the absence of a thorough buying test.

• **Los Angeles**—Prices are holding unchanged despite the absence of active domestic demand.

Iron Ore . . .

Iron Ore Prices, Page 188

Shipments of Lake Superior iron ore in September totaled 8,361,220 gross tons (7,877,142 from U. S. ports, 484,078 from Canadian), reports the American Iron Ore Association.

The total movement in the 1960 shipping season through September was 60,680,434 gross tons, up 23,492,826 tons from the 37,187,608 moved to the same date in the 1959 shipping season.

Imports of 3,745,252 gross tons of iron ore in July brought the total for the January-July period to 21,105,679 gross tons, reports the U. S. Bureau of Mines. July shipments were valued at $35.7 million tons, those for the first seven months, $194,942,341.

Imports in July and the first seven months:

Iron Ore Imports—July, 1960
(Gross tons)

Source	July Tonnage	1st Seven Months, 1960
Brazil	129,068	882,955
British W. Africa	.....	24,650
Canada	2,004,693	5,795,743
Chile	283,403	2,371,010
Cuba	.....	2,820
Denmark	.....	468
Iran	1,968	1,968
Rep. of Guinea	.....	5,672
Liberia	43,106	594,102
Mexico	9,683	106,836
Peru	204,325	2,135,365
Philippines	.....	1,000
Portuguese Asia	.....	56,900
Spain	.....	180
Sweden	.....	20,744
United Kingdom	.....	120
Venezuela	1,069,006	9,105,146
Total	3,745,252	21,105,679

Pig Iron . . .

Pig Iron Prices, Page 186

Merchant pig iron demand is unchanged and slow. Most job shops are operating only three or four days a week. Pig iron stocks are plentiful.

Blast furnace operations in the Buffalo district increased sharply last week as settlement of a railroad strike enabled the Bethlehem Steel mill in Lackawanna to resume production. Bethlehem re-

(*Please turn to Page* 197)

FOR SALE

One new Electric Arc Furnace Charging Bucket Including Bale
Type: Cable Operated—Clamshell
Capacity: 1486 Cu. ft. = 55 tons
Max Dia Closed: 17′-9″
Max Dia Opened: 18′-8″
Max Dia Bottom Opening 12′-6″
Distance from Eye of Bale to Bottom of Bucket Open and closed 14′-0″
Weight: 48,000 lbs.

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Oct. 12, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Oct. 12	$30.17
Oct. 5	30.67
Sept. Avg.	32.00
Oct. 1959	44.00
Oct. 1955	45.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	24.00-25.00
No. 1 dealer bundles	29.00-30.00
No. 2 bundles	22.00-23.00
No. 1 busheling	28.00-29.00
No. 1 factory bundles	35.00-36.00
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	34.00-35.00
3 ft and under	33.00-34.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	36.00-37.00
Electric furnace bundles	35.00-36.00

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Stove plate	32.00-33.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	36.00-37.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Random rails	44.00-45.00
Angles, splice bars	43.00-44.00
Railroad specialties	38.00-39.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*28.00-30.00*
No. 1 hvy melt., dealer	*26.00-27.00*
No. 2 hvy melting	*24.00-25.00*
No. 1 factory bundles	31.00-32.00
No. 1 dealer bundles	*27.00-28.00*
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	*28.00-30.00*
No. 1 busheling, dealer	*26.00-27.00*
Machine shop turnings	*11.00-12.00*
Mixed borings, turnings	*13.00-14.00*
Shovel turnings	*13.00-14.00*
Cast iron borings	*13.00-14.00*
Cut structurals, 3 ft	*30.00-31.00*
Punchings & plate scrap	*32.00-33.00*

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Stove plate	*30.00-31.00*
Unstripped motor blocks	*28.00-29.00*
Clean auto cast	*41.00-42.00*
Drop broken machinery	*41.00-42.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*30.00-31.00*
R.R. malleable	*40.00-41.00*
Rails, 2 ft and under	*42.00-43.00*
Rails, 18 in. and under	*43.00-44.00*
Angles, splice bars	*37.00-38.00*
Axles	*49.00-50.00*
Rails, rerolling	*49.00-50.00*

Stainless Steel Scrap

18-8 bundles, solids	*160.00-165.00*
18-8 turnings	*80.00-85.00*
430 bundles & solids	80.00-85.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	21.00-22.00
No. 2 heavy melting	16.00-17.00
No. 1 bundles	*23.00-24.00*
No. 2 bundles	13.00-14.00
No. 1 busheling	20.00-21.00
Machine shop turnings	7.00-8.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	9.00-10.00

Cast Iron Grades

No. 1 cupola	*31.00-32.00*
Stove plate	25.00-26.00
Heavy breakable	25.00-26.00
Unstripped motor blocks	19.00-20.00
Charging box cast	25.00-26.00
Clean auto cast	40.00-41.00

CLEVELAND

No. 1 heavy melting	*26.00-27.00*
No. 2 heavy melting	20.00-21.00
No. 1 factory bundles	30.00-31.00
No. 1 bundles	*26.00-27.00*
No. 2 bundles	16.00-17.00
No. 1 busheling	*26.00-27.00*
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	*30.00-31.00*
Cut structurals, plate 2 ft and under	*33.00-34.00*
Low phos. punchings & plate	*27.00-28.00*
Alloy free, short shovel turnings	*14.00-15.00*
Electric furnace bundles	*27.50-28.50*

Cast Iron Grades

No. 1 cupola	*40.00-41.00*
Charging box cast	*29.00-30.00*
Heavy breakable cast	*26.00-27.00*
Stove plate	*35.00-36.00*
Unstripped motor blocks	*28.00-29.00*
Brake shoes	35.00-36.00
Clean auto cast	*44.00-45.00*
Burnt cast	*34.00-35.00*
Drop broken machinery	*44.00-45.00*

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	*46.00-47.00*
Rails, 18 in. and under	*47.00-48.00*
Rails, random length	*40.00-41.00*
Cast steel	*32.00-33.00*
No. 1 railroad cast	43.00-44.00
Railroad specialties	*37.00-38.00*
Angles, splice bars	*39.00-40.00*
Rails, rerolling	*51.00-52.00*

Stainless Steel Scrap

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*160.00-165.00*
18-8 turnings	*70.00-75.00*
430 clips, bundles, solids	*75.00-80.00*
430 turnings	20.00-30.00†

YOUNGSTOWN

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	21.00-22.00
No. 1 busheling	*28.00-29.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*18.00-19.00*
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	*29.00-30.00*
Electric furnace bundles	*29.00-30.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*30.00-31.00*

BUFFALO

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	27.00-28.00
No. 2 bundles	19.00-20.00
No. 1 busheling	27.00-28.00
Shovel turnings	15.00-16.00
Machine shop turnings	11.00-12.00
Cast iron borings	13.00-14.00
Low phos. structurals and plate, 2 ft and under	35.00-36.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	39.00-40.00
No. 1 machinery	46.00-47.00

Railroad Scrap

Rails, random lengths	39.00-40.00
Rails, 3 ft and under	45.00-46.00
Railroad specialties	38.00-39.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	24.50-25.50
No. 2 heavy melting	20.50-21.50
No. 1 bundles	24.50-25.50
No. 2 bundles	16.00-17.00
No. 1 busheling	24.50-25.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	11.00-12.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	33.00-34.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable cast	29.00-30.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*30.00-31.00*
Rails, 18 in. and under	*46.00-47.00*
Rails, random lengths	*39.00-40.00*

PHILADELPHIA

No. 1 heavy melting	*34.00*
No. 2 heavy melting	*30.00*
No. 1 bundles	36.00
No. 2 bundles	21.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00
Machine shop turnings	15.00
Heavy turnings	28.00†
Structurals & plates	38.00-40.00
Couplers, springs, wheels	40.00
Rail crops, 2 ft & under	50.00-51.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	38.00
Drop broken machinery	49.00-50.00
Malleable	46.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	30.00-31.00
No. 2 bundles	16.00-17.00
Machine shop turnings	6.00-7.00
Mixed borings, turnings	7.00-8.00
Shovel turnings	8.00-9.00
Low phos. structurals & plates	33.00-34.00†

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	30.00-31.00

Stainless Steel

18-8 sheets, clips, solids	*155.00-160.00*
18-8 borings, turnings	80.00-85.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	*65.00-70.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*24.00-25.00*
No. 2 heavy melting	20.00-21.00
No. 1 bundles	*24.00-25.00*
No. 1 busheling	*24.00-25.00*
Machine shop turnings	*5.00-6.00*
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	*22.00-23.00*
No. 1 bundles	29.00-30.00
No. 2 bundles	20.00-21.00
No. 1 busheling	31.00-32.00
Cast iron borings	10.00-11.00
Machine shop turnings	17.00-18.00
Shovel turnings	19.00-20.00
Bar crops and plate	*36.00-37.00*
Structurals & plate	*36.00-37.00*
Electric furnace bundles	*31.00-32.00*
Electric furnace:	
3 ft and under	35.00-36.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	*46.00-47.00*
Stove plate	47.00-48.00
Unstripped motor blocks	35.00-36.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	39.00-40.00
Angles, splice bars	*37.00-38.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	28.00
No. 2 heavy melting	26.00
No. 1 bundles	30.00
No. 2 bundles	19.00
No. 1 busheling	*30.00*
Machine shop turnings	7.50
Shovel turnings	9.50

Cast Iron Grades

No. 1 cupola	*40.00*
Charging box cast	35.00
Heavy breakable cast	*33.00*
Unstripped motor blocks	35.00
Clean auto cast	42.00
Stove plate	*36.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*30.00*
Rails, random lengths	36.00
Rails, rerolling	50.00
Rails, 18 in. and under	39.00
Angles, spiire bars	36.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	20.00-21.00†
Machine shop turnings	nom.
Low phos. plate & structurals:	
3 ft	37.00
2 ft and under	*38.00-39.00*

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	31.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

LOS ANGELES

No. 1 heavy melting	30.00*
No. 2 heavy melting	27.00
No. 1 bundles	25.00*
No. 2 bundles	15.00*
Machine shop turnings	11.00
Shovel turnings	13.00
Cast iron borings	13.00
Cut structurals and plate 1 ft and under	44.00†

Cast Iron Grades

No. 1 cupola	39.00-44.00†

Railroad Scrap

No. 1 R.R. heavy melt.	39.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*39.00*
No. 2 heavy melting	*36.00*
No. 2 bundles	*21.00*
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	33.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	38.50
No. 2 (prepared for shears)	30.00
No. 1 hvy (unprepared)	35.00
No. 2 heavy melting	35.50
No. 2 hvy (unprepared)	33.00
No. 1 (prepared for shears)	33.00
No. 2 bundles	23.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	36.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	*33.00*
No. 2 heavy melting	*29.00*
No. 1 bundles	*27.00-28.00*
No. 2 bundles	*18.00*
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	*45.00*
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.

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Lead-Zinc Sales Won't Match '59's

Fourth quarter so far holds little promise of a significant upswing. Strikes that curtail output help both metals. Prices are weak. Copper cut 3 cents a pound

Nonferrous Metal Prices, Pages 196 & 197

LEAD AND ZINC SALES aren't showing any substantial fourth quarter pickup.

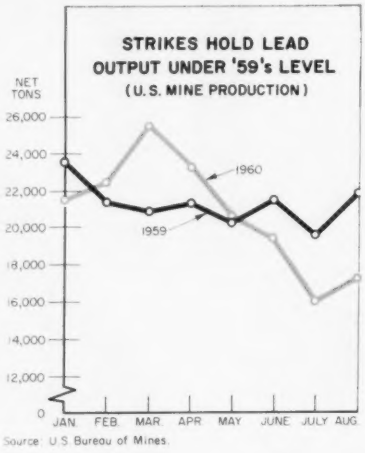
While October is running at a better clip than September, particularly for zinc, the market remains shaky enough to cast doubt on whether either metal can maintain the current quotation throughout the year. November and December are impossible to forecast with today's hand-to-mouth buying policies, say metalmen, but no major improvement is expected.

• **Under '59's**—It would take a minor miracle for zinc and a major one for lead to pull 1960 sales to the level of last year's. Through September, shipments of slab zinc totaled 632,803 tons. In the same period last year, the figure was 659,271 tons.

Statistically, the lead outlook is the bleakest. Through August, deliveries to fabricators by U. S. primary refineries came to 266,029 tons. In the like period of 1959, deliveries were almost 100,000 tons greater—364,251 tons. Significantly, U. S. consumption, while down, has not dropped as fast as shipments. Consumers have been eating heavily into stocks all year, which indicates they'll have to start coming into the market for more metal before too much longer.

• **Output Down**—Through the first nine months, slab zinc production ran just a hair ahead of the same period last year—670,850 tons vs. 662,070 tons in 1959. It's likely that 1960 will fall under 1959. Here's why: September output (at 60,004) was the lowest for any month in either 1960 or 1959, and August wasn't too much better at 63,840 tons. Behind the drop in output: Strikes at properties of Bunker Hill Co. and New Jersey Zinc Co. which are tying up 17,000 to 18,000 tons a month.

Actually, the lower output resulting from the strikes has probably staved off a price drop in zinc. And while no price change seems to be in the wind, the current quotation couldn't be called firm.



Source: U.S. Bureau of Mines.

Lead production will also be down this year in the U. S. Domestic mine production seems certain to fall below last year's, which was the smallest since 1899. Through the first eight months, mine output hit 165,489 tons compared with 170,129 tons in the same period last year (see chart). And with about 7000 tons a month currently being lost due to strikes, it looks like the differential between 1960 and 1959 will be even higher by the end of the year.

Smelter production is down only slightly: 285,697 tons through August vs. 298,025 in the like period of last year.

• **Stocks Shift**—Zinc stocks came down to 192,466 tons in September after hitting their high point of the year at 207,059 tons in July. If strikes continue, you can look for them to decrease an additional 30,000 to 40,000 tons by yearend.

Lead stocks have been rising. Between the first of January and the end of August, they went from 119,993 tons to 138,365 tons.

Mounting lead stocks definitely put the price under pressure, but the consensus is it probably won't fall—at least for the time being.

• **Quotas to Stay**—It appears to be a safe bet that government intervention in the lead-zinc market will continue to be limited to the system of quotas, at least until a new administration takes over. The Tariff Commission recently advised the President against any change in quotas. That, along with President Eisenhower's reluctance in the past to look favorably on either tariffs or subsidy payments, seems to rule out any action before 1961.

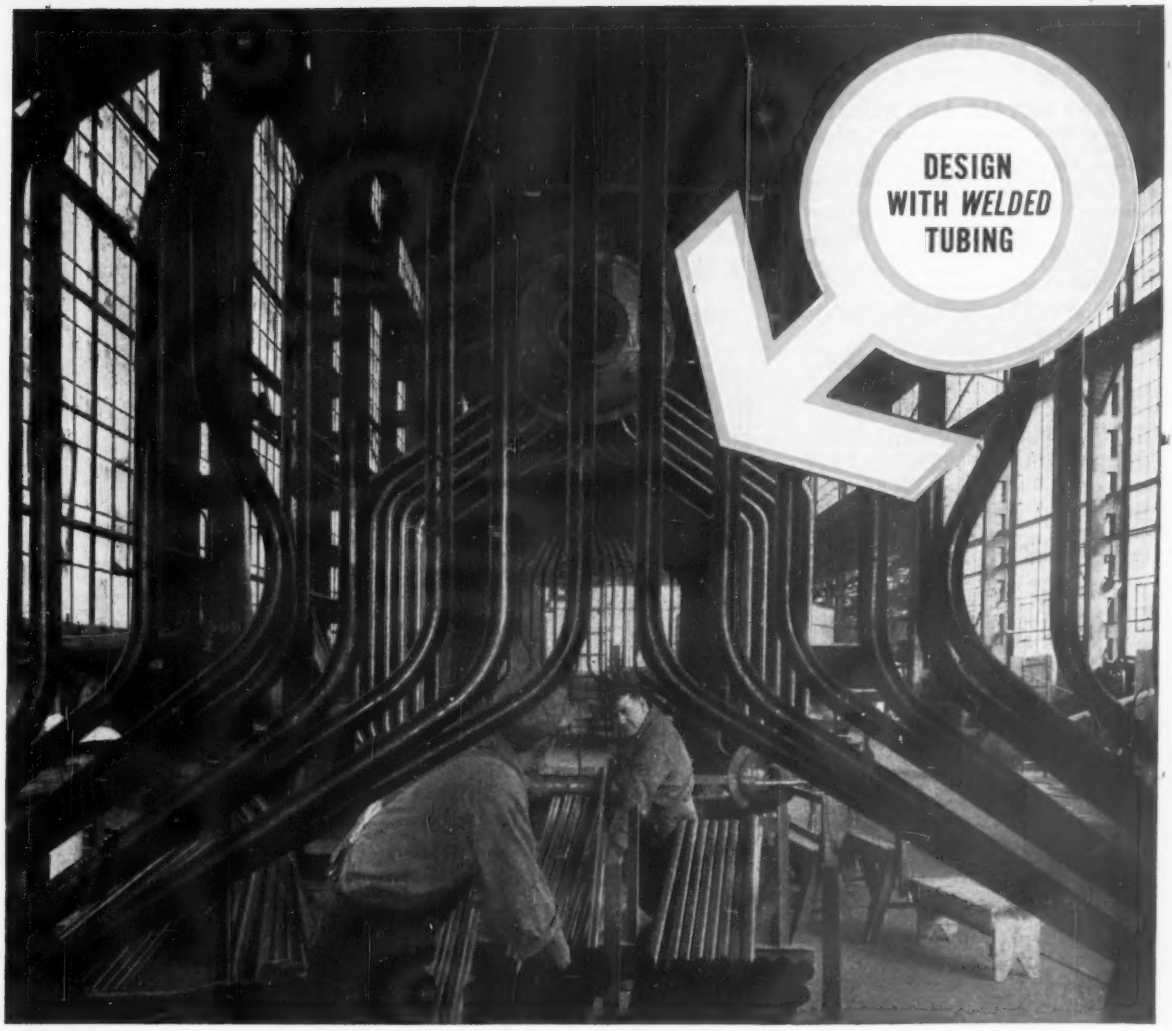
Copper Cut 3 Cents

The primary copper price was lowered by 3 cents a pound last Wednesday (Oct. 12) to 30 cents. It's the first change in the primary quotation since last Nov. 5 and the first cut since July 14, 1959.

Primary producers were spurred to the move after custom smelters lowered their quotations by 2 cents (to 31 cents a pound) on Oct. 3. The custom smelters cited a world production rate that's too high in the face of disappointing demand and falling overseas prices.

Primary producers were also motivated by the need to help their fabricators who had been paying 33 cents a pound for copper. This put the fabricators at a disadvantage when competing in the U. S. market with foreign mills, which already had the advantage of lower labor costs.

As STEEL went to press, it appeared likely the custom smelters would lower prices another cent.



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These are reassuring facts to count on, whatever your product where tubing is used. They mean easier fabrication at lower cost, together with complete dependability in performance on the job.

Great design freedom is provided by the wide range of carbon and stainless grades at your command in welded steel tubing. Write for data-filled Bulletin 8591—and for immediate information on your current requirements, call a quality welded tube producer.

LC-603

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.50-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or heads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 30.00 deld.; custom smelters, 31.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 101.75.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire 22.50-23.00; No. 2 heavy copper and wire, 20.50-21.00; light copper, 18.50-19.00; No. 1 composition red brass, 17.50-18.00; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	57.13b	54.86c	....	58.32
Yellow Brass	50.57	36.06d	50.86	54.23
Low Brass, 80%	53.53	53.22	53.82	57.09
Red Brass, 85%	54.58	54.27	54.87	58.14
Com. Bronze, 90%	56.17	55.86	56.46	59.48
Manganese Bronze	58.86	52.21	62.69	....
Muntz Metal	53.20	48.26	....	....
Naval Brass	55.12	48.68	61.43	58.78
Silicon Bronze	62.86	61.80	62.15	80.79
Nickel Silver, 10%	65.98	68.06	68.06	....
Phos. Bronze	77.44	78.19	77.69	79.37

SCRAP ALLOWANCES e (Based on copper at 33.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	29.000	29.000	28.250
Yellow Brass	22.250	21.250	20.250
Low Brass, 80%	24.750	24.500	24.000
Red Brass, 85%	25.750	25.500	25.000
Com. Bronze, 90%	26.750	26.500	26.000
Manganese Bronze	20.750	20.500	20.000
Muntz Metal	20.875	20.625	20.125
Naval Brass	20.750	20.500	20.000
Silicon Bronze	28.375	28.125	27.375
Nickel Silver, 10%	26.875	26.625	13.437
Phos. Bronze	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 16.00-16.50; new brass clippings, 14.50; light brass, 10.50-11.50; heavy yellow brass, 11.50-12.50; new brass rod ends, 12.50-13.00; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 12.75-13.25; brass pipe, 13.50-14.00.

Lead: Soft scrap lead, 7.75-8.00; battery plates, 3.00; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 5.25-5.50; segregated low copper clips, 12.00-13.00; segregated high copper clips, 11.50-12.00; mixed low copper clips, 12.00-12.50; mixed high copper clips, 11.00-11.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.
Copper and Brass: No. 1 heavy copper and wire, 25.00; No. 2 heavy copper and wire, 23.00; light copper, 20.75; refinery brass (60% copper) dry copper content, 20.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.75; No. 2 heavy copper and wire, 23.00; light copper, 20.75; No. 1 composition borings, 19.75; No. 1 composition solids, 20.00; heavy yellow brass solids, 15.00; yellow brass turnings, 14.25; radiators, 16.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.
Copper: Flat-rolled, 50.04; oval, 46.50. 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29 999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.
Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.
Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.
Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.
Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.
Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.
Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.
Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.
Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.
Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.
Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 110.20; 100-1900 lb, 108.20; 2000 lb or more, 106.20.
Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 191*)

lighted three blast furnaces which had been banked during the rail strike.

The Troy, N. Y., stack also has resumed operations after a suspension of several months.

Plates . . .

Plate Prices, Page 181

Buying of plates is a trifle improved. Railroad specifications are coming out a little more freely, and shipwork is edging more into the picture. Fifteen ocean cargo ships have been placed since July 1, and more are under negotiation. The Naval shipyards are ordering more actively.

Structural work is also giving demand a mild boost, being reflected largely in more activity in floor plates. Buying for heavy construction, weldments, and tanks continues slow.

Distributors . . .

Prices, Page 186

Steel service center business is sluggish, but it's a trifle more active on a daily basis than it was a month ago. Generally, the situation continues to be disappointing, and most distributors will write 1960 off as a poor year.

European prices quoted for service centers in the Houston area have been cut about $2.50 a ton, the first important price change in five months. A major French mill is offering quantity rebates (5 cents a 100 lb off on the purchase of 250 tons) on angles, channels, I-beams, and round bars. The rebate offer on reinforcing bars is 5 cents per 100 lb on purchases up to 1000 tons; 20 cents per 100 lb on purchases of more than 1000 tons.

Tool Steel . . .

Tool Steel Prices, Page 185

Shipments of tool steels (excluding hollow drill steel) in August totaled 5716 net tons, reports the American Iron & Steel Institute. That compares with 4684 tons moved in the preceding month, and 5044 in August, 1959.

The tonnage moved in the first eight months this year was 63,649 compared with 66,642 tons in the same period last year.

Wire . . .

Wire Prices, Pages 183 & 184

Demand for manufacturers' wire and high carbon specialties is up slightly. Most fourth quarter orders specify prompt shipment. The mills can usually comply. Some specialty producers have been operating at a higher rate than the steel industry over-all. One Eastern plant, for example, has been engaged at 80 per cent for weeks.

Tonnage demand for the heavier standard products, including welded highway mesh and fabric, is substantial.

New prices on knitting-quality stainless steel and Monel wire were announced last week by Riverside-Alloy Metal Div. (Riverside, N. J.) of H. K. Porter Company Inc. Sizes available under the new price schedule: 0.0035 in., 0.0045 in.. 0.005 in., 0.0055 in., 0.006 in., 0.0065 in., 0.007 in., 0.008 in., 0.009 in., 0.010 in., and 0.011 in. The wire is put up on 2, 5, and 10 pound spools.

Rails, Cars . . .

Track Material Prices, Page 184

Railroad equipment purchasing prospects were brightened last week by a $22.5 million program. The Burlington Lines will purchase 36 diesel locomotives and 1385 roller-bearing freight cars in 1961.

CLASSIFIED

Help Wanted

Sales Engineer

Good opportunity for young man with experience as tool engineer, specializing in carbides and their applications, who wants to enter selling field.

If interested in further particulars, reply to:

Eric Nelson
392 West Broadway New York 12, N. Y.
WAlker 5-7981

Help Wanted

GENERAL MANAGER FOR SMALL STEEL ROLLING MILL—Broad experience. Age 35 to 50. Salary open. All replies confidential Submit resume of experience to Box 877, STEEL, Penton Bldg., Cleveland 13, Ohio.

FOR CLASSIFIED RATES
And Further information write
STEEL, Penton Bldg., Cleveland 13, O.

MANY FAST'S HAVE BEEN WORKING LONGER THAN YOU

It's a fact. There are plenty of cases where Fast's Couplings have been in service 20 to 40 years. And some of our more enthusiastic engineers say a Fast's should last forever if it's properly applied, installed and lubricated. Whatever opinion you accept, you can bet Fast's Couplings will give you the same smooth-running, low-maintenance, long-lived performance that makes them the choice of more equipment manufacturers than any other gear-type coupling.

For example, Fast's Coupling No. 1347, shipped in July, 1922, is still in service—and the customer is just ordering his first spare coupling 38 years later. KOPPERS COMPANY, INC., 310 Scott Street, Baltimore 3, Md.

KOPPERS ® **FAST'S COUPLINGS**
Engineered Products Sold with Service

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FOR *Cold* BENDING AND STRAIGHTENING
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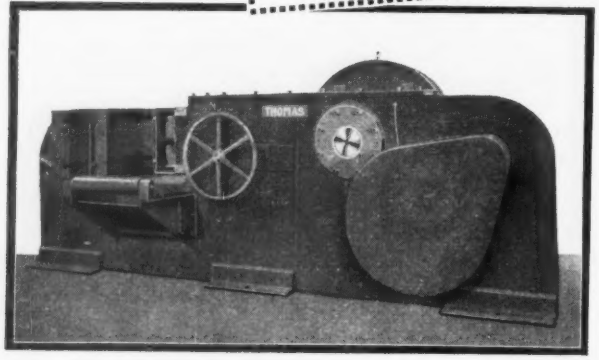

Write for Bulletin 315

The Thomas all-steel Bending and Straightening Machine is built in six sizes, varying from 50 to 400 tons. It does the job quickly and efficiently either *before* or *after* fabricating.

• *Rams are quickly and easily adjustable by means of convenient handwheel so located that operator has unobstructed view of work.*

THOMAS
MACHINE MANUFACTURING CO.
PITTSBURGH 23, PA.

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STEEL PLATE LOGGING GRAPPLE WITH AN 84-INCH REACH

This grapple, which can pick up an 84-in. diameter log, is the largest ever made by American Boiler Works, Everett, Wash., and believed to be one of the largest in existence.

The huge steel grapple weighs 4,000 lb. It would have weighed more except that it was fabricated from high-strength, low-alloy, Manganese-Vanadium steel plate rolled at Bethlehem's Seattle plant. This steel has the strength necessary for a "Paul Bunyan" tool such as this, but at a weight-saving that gives it high mobility.

The uniform quality of Bethlehem plates makes them ideal for weldments of all types. Bethlehem plates are available in a full range of sheared and universal mill sizes. For full details, call the nearest Bethlehem sales office.

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Export Sales: Bethlehem Steel Export Corporation

Steel

For strength
. . . economy
. . . versatility

BETHLEHEM STEEL

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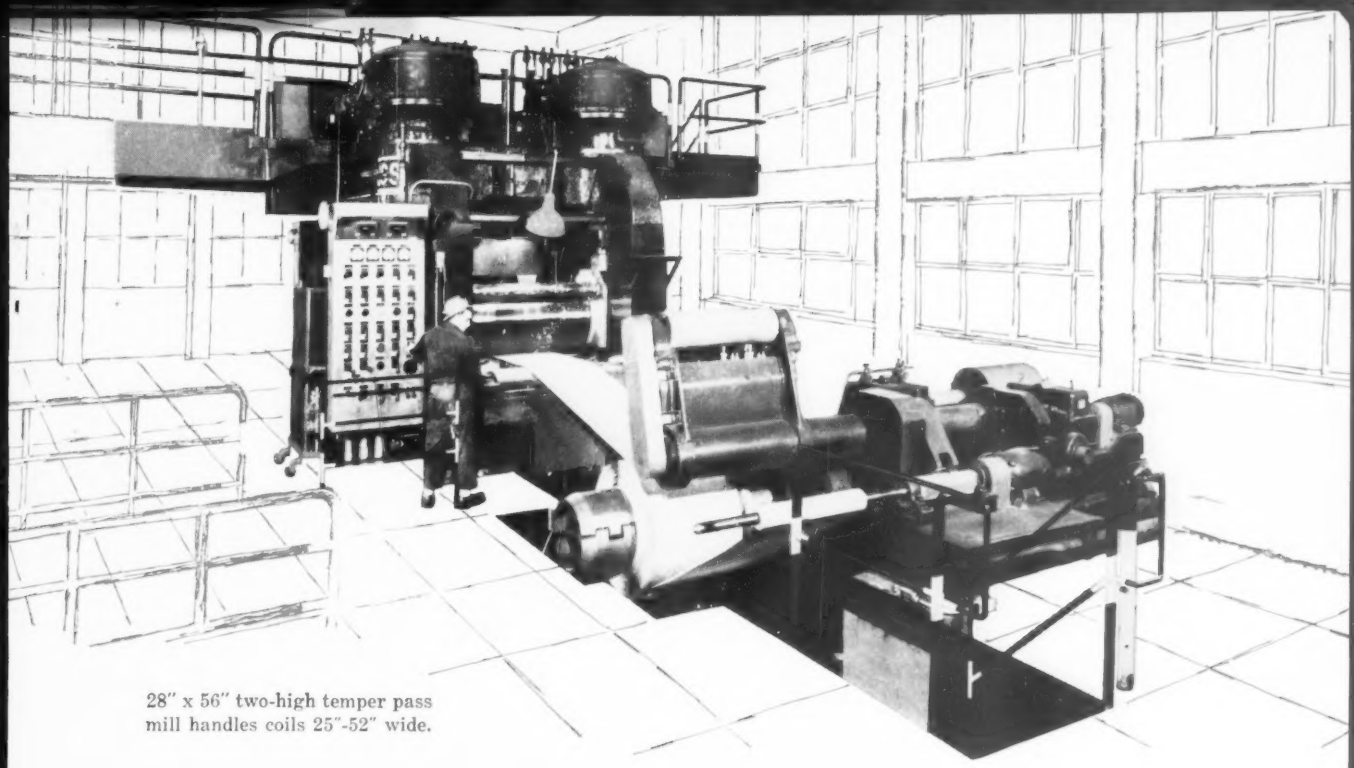

28" x 56" two-high temper pass mill handles coils 25"-52" wide.

Now 2 new Bliss mills help keep tempers under control at Gary Sheet & Tin

Until last summer, Gary Sheet & Tin tempered "stainless" on the temper mills used for carbon steel. Then to add a new dimension of efficiency, the plant decided to set up separate facilities for stainless and installed a new Bliss temper pass mill to handle it.

Product of Gary and Bliss thinking, the mill takes coils as wide as 52", as narrow as 25"; tempers gages from .008-.150" to an average hardness of 83 Rockwell. Result: this plant of U.S. Steel is now more able to take heavy workloads and special orders in stride.

Another Bliss temper mill is paying similar dividends in Gary's continuous pickling line. Key addition of an April '59 expansion program, this 34" x 76" two-high mill with husky entry and delivery bridles enables Gary to handle strip 18"-62" wide, in thicknesses from .059"-.187". It reduces stock 1½-2%, serving to fracture the scale, thus resulting in less pickle liquor required and higher pickling rate.

Can a custom-designed Bliss mill help you solve a profit-robbing problem? See how the Rolling Mill Division has assisted other plants. Write today for our 84-page Bulletin 40-B.

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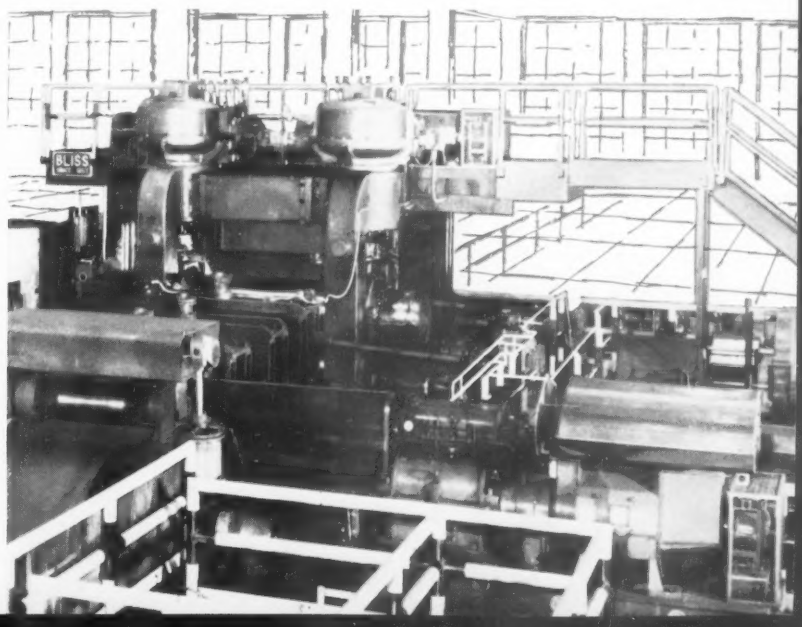

34" x 76" two-high mill in Gary's continuous pickling line descales and tempers at the same time.

within 24 hours

any day is the right day to order your Timken® 52100 steel tubing, and within 24 hours of receiving your order it will be on its way. To give you this fast service on less than mill quantities, we stock 101 sizes—from 1″ O.D. to 10½″ O.D.—in a new, modern warehouse. And the same fast service is available on 50 sizes of 4620 tubing. You can save time and money by remembering that 90% of all your structural parts can be made from one or the other of these two steel analyses. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

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